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BIOMEDICAL AND BEHAVIORAL SCIENCES



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**USSR REPORT
LIFE SCIENCES
BIOMEDICAL AND BEHAVIORAL SCIENCES**

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BIOLOGIST PROTECTS THE FIELD

Moscow IZVESTIYA in Russian 23 May 84 p 2

[Interview with N.A. Filippov, director of the All-Union Scientific-Research Institute for Biological Methods of Plant Protection and candidate of agricultural sciences, by IZVESTIYA correspondent A. Romanov in Kishiniv; date of interview not specified]

[Text] The problems involved in the introduction of biological methods of plant protection into agricultural practice is the subject of a conversation between IZVESTIYA correspondent A. Romanov and N. Filippov, director of the All-Union Scientific-Research Institute for Biological Methods of Plant Protection and candidate of the agricultural sciences.

[Question] Nikolay Antol'yevich, tell us, please, what is the biological method of plant protection and what are its advantages.

[Answer] The worldwide practice of plant protection is showing more and more interest in the biological method of combatting pests, plant diseases and weeds in agriculture. The essence of this method is that in combatting the most widespread insect pests, use is made of their natural enemies, or entomophages, to use the scientific term.

Experience shows that the biological method is very effective and the main thing is that it is absolutely harmless to man as well as to the normal development of useful flora and fauna. This is why it is acquiring primary importance both in increasing the yield of agricultural crops and in protecting our environment.

Our institute was established in 1969 on the basis of the Kishinev Scientific-Research Institute for the Protection of the Plants of the Southwestern Regions of the USSR with the purpose of more effective development of the theoretical bases and practical methods for the utilization of biological means of plant protection. The institute has six support centers located in various zones of the country.

[Question] Specialists have calculated that we lost 1 out of every 5 kilograms of grown production to pests and disease every year. In the country as a whole, these annual losses amount to tens of millions of tons. How widely is the biological method applied in our country to prevent these losses and how

effective has it been?

[Answer] I will begin with a comparison. Whereas, for example, in 1960 the method was utilized on an area of only 200,000 hectares, last year it was employed on more than 20 million hectares and almost 7,000 hectares of covered ground. More than 1,000 biofactories and biolabs involved in the breeding of useful insects and microorganisms are operating in various regions of the country.

Our most popular "weapon" is the trichogramma, a tiny insect. It is a parasite on the eggs of almost 200 species of harmful insects and thus destroys their offspring. The trichogramma is used to protect corn, sugar beets, vegetables, cotton and other crops over an area of more than 13 million hectares.

Contributing to this is the industrial technology of breeding trichogramma developed through the efforts of scientists at the All-Union Institute for Plant Protection and the Agropribor Scientific-Production Association, providing for full mechanization of all processes and reducing the production cost to obtain the trichogramma to less than one-fiftieth of that of the laboratory method. One such mechanized line "puts out" 4 to 5 million insects daily, enough to process 35,000 to 40,000 hectares.

The use of the trichogramma increases the grain yield per hectare by an average of 2 to 3 quintals, that of sugar beets by 2.35, cabbage by 20 to 30 and raw cotton by 9 to 10 quintals. And what is especially important, there is a significant reduction in the number of chemical applications to the crops.

In the last 5 years, much greater use was made of the trichogramma in Central Asia, Transcaucasia and the southern regions of the Nonchernozem Zone. Last year, in Uzbekistan alone, they were used on 2.5 million hectares of cotton. In Moldavia, there was almost a tenfold increase in the crop areas where biological means of plant protection replaced chemical means.

[Question] What other species of entomophages are used for plant protection?

[Answer] One of the active "devourers" of harmful insects is the lacewing. Its larvae destroy entire colonies of aphids, the eggs of the Colorado beetle, various cutworms, etc. All told, it is capable of neutralizing the representatives of almost 50 species of harmful insects.

A group of our scientists was able to create for the lacewing an artificial feed comprised basically of wastes from agricultural production and products from the microbiological industry. It costs one-thirtieth to one-twentieth as much as what the lacewing feeds upon under natural conditions. Means of mechanization are being developed that will make it possible to lower the cost of breeding and dispersing the lacewing on the fields. Then it will be possible to make even wider use of it in combatting harmful insects.

More and more effective use is being made of biological means in greenhouses. Horticulturists know what dangerous pests the greenhouse "belokrylka" and various mites and aphids are for cucumbers and tomatoes ripening on covered ground. Scientists have developed methods of providing biological protection for a number of vegetable crops on covered ground with the aid of useful insects and microorganisms.

The application of these methods, however, is being held back by the fact that most greenhouses have no biological laboratories. Their construction must be included in the planning of new greenhouses.

[Question] Nikolay Anatol'yevich, you spoke convincingly of the advantages of the biological method. But why is it so slow to be applied on a larger scale? What overall measures must be taken for this in the country?

[Answer] As I see it, one of the main reasons is the psychological barrier. Farmers have already become accustomed to using chemicals on their fields and, unfortunately, they rarely thought about the consequences of the mass application of toxic chemicals. To be sure, many are now beginning to turn to the biological method.

But there are difficulties of another nature. The technology for the production of the domestic biological compound endobacterin was developed in the early 1950's but industrial production did not begin until the end of the 1960's. Unfortunately, the enterprises of the Main Administration for Microbiological Industry are not producing the microbiological compounds in the planned quantities and assortment. There are now only four bacterial compounds being issued and they are of low quality and quantities are insignificant. Industry is not producing such urgently needed biological compounds as trikhodermin, boverin, trikhotetsin, baktorodentsid, fitobakteriomitsin and others.

It should also be noted that the Agropribor Scientific Production Association is slow in developing and producing equipment for the mass breeding of a number of promising entomophages.

A serious handicap is the lack of an experimental base at research institutions. Unfortunately, that also applies to our institute. There is still no organized service for controlling the quality of biological compounds developed at the plants of the Main Administration for Microbiological Industry and at biological laboratories.

And finally, a word about personnel. It may seem strange, but there is still no one in the country training a force of specialists who could competently develop and introduce the biological method. Only 50 hours are devoted to the special course on the biological method that is given at agricultural institutes. With no more knowledge than that, specialists can certainly not be seriously involved in solving the complicated problems of biological methods of plant protection.

[Question] What concrete measures is the collective of your institute taking for a more extensive introduction of biological methods of plant protection this year?

[Answer] There are real possibilities of reducing the application of pesticides in agriculture, particularly in horticulture, fruit growing and winegrowing. The collective of our institute is expanding research in the ecological aspects of plant protection and in developing methods for the maximum

preservation and activation of the natural populations of entomophages--the natural regulators of the numbers of harmful insects, especially on vegetable and grain crops as well as in gardens.

The methods for the mass breeding at the biological factories and the biological production laboratories of the trichogramma, the basic resource in the biological struggle against a number of harmful insects, will be improved this year. A production check of the establishment of the trichogramma will be carried out over tens of thousands of hectares from the air, which will make it possible to increase labor productivity sharply and to reduce labor costs.

We will be more actively involved in the introduction of more advanced methods of utilizing microbiological compounds and various entomophages in greenhouses.

In conclusion, I would like to note that, in the majority of cases, the use of biological methods is less expensive than the widely used means of chemical plant protection. The widespread assimilation of biological methods will have beneficial results not only in preventing crop losses but also in protecting the environment.

9746
CSO: 1840/1066

UDC 633.11:631.52:31

USE OF MULTIVARIATE STATISTICS IN SELECTING PAIRS FOR HYBRIDIZATION.
COMPARISON OF VARIOUS ESTIMATES OF GENETIC DIVERGENCE

Kiev TSITOLOGIYA I GENETIKA in Russian No 2, Mar-Apr 84
(manuscript received 24 Aug 82) pp 105-110

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[Abstract] Statistical analysis of genetic divergence of 56 wheat sorts was carried out by means of Mahalanobis and Euclidean distances in the area of primary indices and principal components. In addition, the results of cluster analysis based on above-distance indices were used along with direct classification by means of Q-technique factor analysis. The results showed a close correlation of Euclidean distances and a weak association with Mahalanobis distances. The results of cluster analysis agreed partially with the Q-technique factor analysis. On the basis of all classification methods investigated, there was an inadequate correlation between the estimates of genetic divergence and geographic origin of the study species. References 10: 8 Russian (2 by Western authors), 2 Western.

[688-7813]

UDC 581.192.7:582.542.1

AUXIN DEPENDENT BIOSYNTHESIS OF ETHYLENE IN WHEAT PLANTS INFECTED WITH STEM RUST PATHOGEN

Moscow FIZIOLOGIYA RASTENIY in Russian Vol 31, No 3, Mar-Apr 84
(manuscript received 26 May 83) pp 536-541

CHKANIKOV, D.I., ARTEMENKO, Ye.N. SHABANOVA, A.M. and UMNOV, A.M., All-Union Scientific Research Institute of Phytopathology, Moscow Oblast

[Abstract] An assumption was made that an increase in the content of indoly-3-acetic acid (IAA) could occur during formation of stem rust uredospores. Intensified biosynthesis of ethylene could be the direct result of that process, since IAA, acting as a coenzyme, could lead to production of an ethylene precursor the 1-aminocyclopropane-1-carboxylic acid (ACCA).

To verify this assumption, the dynamics of IAA accumulation along with ACCA was studied on the following brands of wheat: Kapli, Selkirk, Li, Wells, Little Club, ACME, Markix, Kubanka and Spel'ma. It was shown that the content of IAA in healthy leaves was low and constant, leading to an assumption that increased content of IAA was caused by the need to supply this phytohormone to stem rust pathogens--the uredospores being produced. The rate of the formation of ethylene followed closely the accumulation curve of IAA, leading to yet another assumption that increased formation of ethylene should be accompanied by increased levels of ACCA, which indeed was observed at the 5-6th days after the inoculation of the plants. The resistant brand Kapli in which uredospores were not formed showed IAA and ACCA levels within the control values. Figure 1; references 9: 4 Russian, 5 Western.
[683-7813]

BIOCHEMISTRY

UDC 577.15.08

ISOLATION OF HIGHLY PURIFIED BACTERIOPHAGE T4 RNA-LIGASE

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 20, No 1, Jan-Feb 84 (manuscript received 14 Sep 82) pp 24-30

ZAGREBEL'NYY, S.N., ZERNOV, Yu.P., MAYSTRENKO, V.F. and PUSTOSHILOVA, N.M., Scientific Research Technological Design Institute of Biologically Active Substances

[Abstract] Highly purified bacteriophage T4 RNA-ligase (EC 6.5.1.3) was prepared from *E. coli* cells using largely Soviet reagents and adsorbents. The procedure involved seven stages of purification, including fractionation on DEAE cellulose and affinity chromatography on ATP-Sepharose or Sepharose Blue, yielding a final RNA-ligase preparation showing 220-fold purification and retaining 20 percent of the activity in the initial *E. coli* B lysate. Evaluation of the final preparation containing 80,000 U/ml showed a homogeneous fraction on polyacrylamide gel electrophoresis, which was virtually free of endo- and exonuclease activities. Figures 5; references 25: 6 Russian, 19 Western.
[1515-12172]

UDC 581.132:581.192

EFFECTS OF SUBSTANCES WITH CYTOKININ ACTIVITY ON PHOTOSYNTHESIS IN CROPS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 20, No 1, Jan-Feb 84 (manuscript received 31 Jan 83) pp 107-114

CHERNYAD'YEV, I.I., FRIYEDRIKH, A., VOL'FOVA, A., KHVOYKA, L. and DOMAN, N.G., Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences, Moscow; Institute of Experimental Botany, Czechoslovak SSR Academy of Sciences, Prague

[Abstract] Two compounds possessing cytokinin-like activity--6-benzylaminopurine (BAP) and a herbicide representing a 1,3,5-substituted triazine--were evaluated for their effects on the photosynthetic apparatus in several crop plants (spring wheat, corn, sugar beets, peas, kidney beans, tomatoes, and leaves of

apple, cherry, and peach trees). Spraying with low concentrations of the agents showed both preparations to be equally effective in stimulating photosynthesis and altering the activities of several enzymes. The activities of protoplast ribulose-1,5-diphosphate carboxylase and NADP-glyceraldehyde phosphate dehydrogenase were increased to a statistically significant extent, that of carbonic anhydrase was increased insignificantly, and that of phosphoenolpyruvate carboxylase was depressed insignificantly. Radiolabeled CO₂ incorporation into 3-phosphoglyceric acid and monosaccharide phosphates was enhanced by BAP and the herbicide, while incorporation into malic acid was decreased. Electron micrographs revealed that the herbicide induces development of chloroplast grains and plastoglobules. Figures 2; references 26: 17 Russian, 6 Western.
[1515-12172]

UDC 547.91

IDENTIFICATION OF N,N-DIMETHYL-O-(β -D-GLUCOPYRANURONOSYL)-5-HYDROXYTRYPTAMINE AS METABOLITE OF BUFOTENINE IN RABBIT BODY

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 2, Feb 84
(manuscript received 18 Jul 83) pp 260-264

VIGDORCHIK, M.M., TURCHIN, K.F., GUS'KOVA, T.A., YAKUBOVICH, L.M., KRASAVINA, L.S., LUKIN, O.V., LUTSENKO, N.G. and SUVOROV, N.N., All Union Scientific Research Chemical-Pharmaceutical Institute imeni S. Ordzhonikidze, Moscow; Moscow Chemical-Technological Institute imeni D.I. Mendeleyev

[Abstract] N,N-Dimethyl-5-hydroxytryptamine (Bufotenine) (I) is a strong psychomimetic which could be involved in pathogenesis of psychological disorders. Metabolism of I has been studied insufficiently. In the past, assumptions were made that N,N-dimethyl-O-(β -D-glucopyranuronosyl)-5-hydroxytryptamine (II) could be a metabolite of I. In the present study II was used as a marker for identifying metabolites of I in the urine of rabbits. Chinchilla rabbits were injected with I and for 24 hrs they were fed only water. A 24-hr urine collection was used to isolate the metabolites. Using a cellulose-column chromatography, followed by preparative electrophoresis in acid buffer, led to isolation of II as shown by comparison to a synthetic specimen. Figures 2; references 6: 2 Russian (1 by Western authors), 4 Western.
[1520-7813]

UDC 577.112.6:541.64

STRUCTURE-ACTIVITY RELATIONSHIP OF VALINOMYCIN SERIES OF CYCLIC DEPSIPEPTIDE.
REPORT 11 [L-Pro², L-Pro⁶, L-Pro¹⁰, L-Pro¹⁴]- and [D-Pro⁴, D-Pro⁸, D-Pro¹²,
D-Pro¹⁶] Hexadecavalinomycines

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 4, Apr 84
(manuscript received 27 Sep 83) pp 437-458

BALASHOVA, T.A., FONINA, L.A., SENYAVINA, L.B., STAROVYOTOVA, N.V., AVOTIN,
G.Ya., IVANOV, V.T. and OVCHINNIKOV, Yu.A., Institute of Bioorganic Chemistry
imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Spectral characteristics were reported along with conformational and ionophoric properties of hexadeca analogues of valinomycine cyclo[-(D-Val-L-Pro-L-Val-D-His)4-] and cyclo [-D-Val-L-Lac-L-Val-D-Pro)4-], showing complex conformational equilibrium in which both the cis and trans configurations of the Val-Pro bonds participated. Principal conformational orientation of these compounds were reported. Replacement of some radicals resulted in predominance of one of the configurations, often dependent on the polarity of the solvent. Proline analogues of valinomycine readily formed complexes with alkali metal ions at a 2:1 ratio, while with organic cations they formed equimolar complexes. When these cations were extracted with depsipeptides from an aqueous into organic medium, high selectivity was observed toward all alkali cations. Figures 8; references 19: 6 Russian, 13 Western (2 by Russian authors).

[1522-7813]

UDC 577.152.6*513'134

SUBSTRATE SPECIFICITY OF T4 RNA-LIGASE. EFFECT OF MINIMAL PHOSPHATE ACCEPTOR NUCLEOTIDE SEQUENCE ON EFFECTIVENESS OF INTERMOLECULAR LIGATION

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 4, Apr 84
(manuscript received 16 Sep 83) pp 498-505

MAYSTRENKO, V.F., PUSTOSHILOVA, N.M., KLYAGINA, V.P., SEDEL'NIKOVA, E.A.,
SMOLYANINOVA, O.A. and ZHENODAROVA, S.M. Scientific Research Design-Technological Institute of Biologically Active Compounds, Berdsk, and Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Systematic investigation was initiated of the effect of nucleotide composition and phosphate acceptor sequence on the effectiveness of intermolecular ligation. The substrate specificity of T4 RNA ligase was studied on 2'(3')5'-diphosphates of cytidine, uridine, adenosine and trinucleoside diphosphates NpCpC, NpCpU, NpUpC, NpUpU and ApNpC where N=U,C,A,G. The ligation was a function of the nucleotide composition of the acceptor and of the nucleotide sequence. The following relationship between the structure of nucleoside residue and acceptor effectiveness was observed for various

phosphite acceptors and pCp donors: C>A>U>G for NpCpC; G>U=A>C for NpCpU; A>U>C>G for NpUpC and A>G>C>U for NpUpU. The yield of ligation products depended on the structure of donors: pyrimidine phosphate donors were more effective than pAp and pCp was more effective than pVp. Figures 4; references 9: 3 Russian, 6 Western.

[1522-7813]

UDC 577.113.6

SYNTHESIS OF 2',3'-CYCLIC ACETALS OF (2'-5')OLIGOADENYLATES AND AFFINITY SORBENTS ON THEIR BASIS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 4, Apr 84
(manuscript received 7 Sep 83) pp 506-514

KVASYUK, Ye.I., KULAK, T.I., ZAYTSEVA, G.V. MIKHAYLOPOLO, I.A. and PFLYAYDERER, V., Institute of Bioorganic Chemistry, BSSR Academy of Sciences, Minsk; University of Constanz, Constanz, FRG

[Abstract] One of the causes for antiviral activity of interferon involves the appearance of 5'-triphosphates of (2'-5')oligoadenylic acid which activates latent endonuclease L leading to cleavage of viral mRNA. To isolate endonuclease L, (2'-5')-trimer of adenylic acid was synthesized along with its 3'-desoxyanalogue which contained (2-carboxyethyl)ethylidene grouping at the terminal adenosine fragment. Mixtures of quinoline-8-sulfonyl chloride:3-nitro-1,2,4-triazole and triisopropylbenzenesulfonyl chloride:3-nitro-1,2,4-triazole were used as condensing agents. The synthesized trimer products were used as ligands for production of affinity sorbents by covalent bonding with Ah-Sepha-rose 4B. Their capacity was 0.86 and 1.39 μ mol/ml of swollen gel for ribo- and 3'-desoxyribo analogues respectively. References 18 Western.

[1522-7813]

UDC 615.811.2:615.273.53].07

ANTITRYPTIC AND ANTICHYMOTRYPTIC ACTIVITIES IN SALIVA AND CHYME OF MEDICINAL LEECH HIRUDO MEDICINALIS

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 30, No 1, Jan-Feb 84
(manuscript received 18 Jan 83) pp 64-66

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[Abstract] The saliva and chyme of the medicinal leech Hirudo medicinalis were studied for antithrombin, anti-tryptic and antichymotryptic activities to

determine their potential commercial and research usefulness. Evaluation of the salivary gland secretions showed the presence of both antithrombin and antitryptic activity; furthermore, antitryptic activity was completely abolished by heating for 15 min at 80°C. while antithrombic activity was not affected. Antichymotryptic activity was lacking in the saliva. Investigations on chyme demonstrated the presence of pronounced antichymotryptic activity, but only low levels of antithrombin and antitrypsin activities. The latter apparently represented residual activity of ingested saliva. Studies on hirudin showed the presence of all three activities in the unpurified preparation, but only of antithrombin and antichymotryptic activity in preparations purified by affinity chromatography and isoelectrofocusing (fractions pI 3.8, 3.9 and 4.0). A pseudohirudin preparation lacked both antitryptic and antichymotryptic activity. Figures 3; references 7: 2 Russian, 5 Western. [1513-12172]

PUTATIVE MECHANISMS OF MECHANICAL ENZYME INACTIVATION

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 29 Apr 83) pp 365-369

YAKUSHEVA, L.D. and DUBINSKAYA, A.M., Scientific Research Institute of Biological Testing of Chemicals, Kupavna, Moscow Oblast; Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] ESR and CD spectroscopies were employed in following structural changes in trypsin molecules subjected to mechanical treatment (milling) at low (80°K) and room (300°K) temperatures, to determine factors responsible for denaturation and loss of enzyme activity. Mechanical treatment was seen to lead to rupture of covalent bonds, including disulfide bonds with the formation of free radicals, and cleavage of peptide bonds as indicated by the increase in amino acids with free N-termini. However, the key factor responsible for loss of activity was identified as conformational rearrangement. The modified conformational state resulted from the reformation of weak covalent, electrostatic and hydrophobic bonds between different regions than seen in the native molecule. Figures 3; references 8 (Russian). [1512-12172]

BIONICS

LANGUAGE OF ANIMALS

Leningrad LENINGRADSKAYA PRAVDA in Russian 16 Jun 84 p 4

[Article by Zh. Manilova under the rubric "Science: Goals, Searches and Achievements" is based on a conversation with Professor V.P. Morozov, Chief of the Bioacoustic Laboratory of the Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov, USSR Academy of Sciences. Passages in uppercase appear in boldface in original source]

[Text] IN STORIES ANIMALS TALK. BUT, WHAT IS THE SITUATION IN REAL LIFE? ARE ANIMALS, BIRDS AND FISH ABLE TO SOCIALIZE WITH LIKE CREATURES BY MEANS OF VOICE AND, IF THEY ARE ABLE, WHAT CAN THEY SAY TO EACH OTHER? TODAY, THESE AND OTHER QUESTIONS SERIOUSLY EXCITE BIOLOGISTS, PARTICULARLY SPECIALISTS IN BIOACOUSTICS.

THIS SCIENCE, EXISTING FOR ONLY A LITTLE MORE THAN THREE DECADES, STUDIES THE AVAILABLE MEANS OF SOUND COMMUNICATION IN NATURE BETWEEN LIVING CREATURES, THE FORMATION AND PERCEPTION MECHANISMS OF SOUNDS, AS WELL AS THE PRINCIPLES OF CODING AND DECODING TRANSMITTED INFORMATION IN LIVE BIOLOGICAL SYSTEMS.

IN A CONVERSATION WITH THE WELL KNOWN SCIENTIST, PROFESSOR V.P. MOROZOV, CHIEF OF THE BIOACOUSTIC LABORATORY OF THE INSTITUTE OF EVOLUTIONARY PHYSIOLOGY AND BIOCHEMISTRY IMENI I.M. SECHENOV, USSR ACADEMY OF SCIENCES, WE SHALL TOUCH UPON THE MODERN VIEWPOINT OF THE LANGUAGE OF SOME ANIMALS, FOR WHICH SCIENCE HAS AVAILABLE FACTS.

"For a long time biologists wrote the term "language of animals" in quotation marks, as if to stress its conditionality. Now, we are no longer embarrassed to write it without quotation marks, thereby recognizing the orthodoxy of this concept for designating the ability of animals to socialize with each other. Of course, the language of animals in the broad sense of this word is a complex concept. There is, also, the language of postures, body movements, etc. But, we are talking about the other one.

The most important characteristic of animal language is its emotional nature. The alphabet of this language includes cries of the type: "Attention!", "Careful, danger!", "Find safety who can" and so on. Another important characteristic of animal language is dependence of the signals on the situation. Here, we observe the similarity with the language of human emotions.

For example, the meaning of the cry "Oh!" we understand only according to the situation. Thus, in contrast to human speech, which has the property to transmit the most complex information of a concrete nature as well as abstract, the language of animals is always concrete and it always signals a concrete situation or state of mind.

"AND, WHAT ABOUT THE QUESTION, ARE ANIMALS ABLE TO SPEAK IN A HUMAN VOICE? MAMMALS, FOR INSTANCE, BECAUSE EVERYONE KNOWS ABOUT TALKING BIRDS?"

"Not long ago a seal by the name of Hoover, who lives in the Boston Aquarium, became a real sensation. He greets visitors with the words: "How do you do?" But, before the delighted visitors have time to regain their composure, Hoover roars: "Scram!" Zoologists believe that Hoover is the first speaking mammal in the world."

"HOW IS THE LANGUAGE OF ANIMALS STUDIED?"

Simple observations of animals can tell us this, however, today new technology comes to the assistance of science. This technology enables us to record the sound, see its acoustical structure as well as determine the timbre and so on. Remember in V.N. Zhukovskiy's poem "All was asleep for the ear in that solitary deep..." The poet was writing about the absence of any kind of sounds in the deep of the sea. However, after lowering a hydrophone into the water, scientists have discovered that the "world of silence" is full of sounds, emitted by its denizens, primarily by fish. The sea robin, for example, cackles, the horse mackerel barks and the burbot rumbles and grunts. The force of the voice of some fish is so great that during the last war some fish caused acoustic mines to explode."

"IN A WORD, THE EXPRESSION "SILENT AS A FISH" HAS BECOME OUTDATED. SO, WHAT DO THEY TALK ABOUT?"

"Soviet scientists have contributed much to the study of the acoustic language of fish. They were the ones to determine the signal importance of various sounds, uttered by fish. Three types of aggressive signals have been singled out: threat, warning and war cry. For example, a short drum-like roll is the danger signal of river perch at the time they hunt small fish. A similar signal of carps is a series of crackling sounds, which the leader produces.

"IN ONE CONVERSATION WE PROBABLY WILL BE UNABLE EVEN TO BRIEFLY TOUCH UPON THE LANGUAGES OF MANY REPRESENTATIVE OF THE ANIMAL WORLD. FOR THIS REASON, PLEASE MAKE THE SELECTION YOURSELF."

"First of all, I want to note the following condition. An overwhelming number of animals use their voice to communicate to another animal. But, there are also animals, who in the evolutionary process learned to use their voice for orientation in surrounding conditions, for finding food and as a means of navigation. These are the so-called echolocation animals that include bats, dolphins and some birds. And, now about the language."

"Science has interesting information available, although incomplete as yet, on the language of insects, specifically bees. Extremely curious data have been received on the language of wolves. I could cite startling facts on this matter, but shall only say that research allows us to assert that with the assistance of their voice wolves are able to transmit complex information to each other: news of the approach of deer herds, appearance of people and so on, with indication of the exact place."

"I sing, therefore I am", is the way the American scientist, George Cherfaz [spelling ?] starts his scientific article on birds. Really, birds were given a voice so that they could ensure their own existence. Take this gift away from them and many of their species will perish because they will be unable to guard their own territory, attract a female, protect their offspring... Specialists have counted dozens of sound signals in the language of birds. And, even the primitive domestic chicken has up to a dozen of such signals in its "lexicon". Incidentally, Soviet and American scientists recently have come to an amazing conclusion: the egg "talks" with the hen! Such contact is quite useful because the chick, while still in the egg, learns through the mother hen about conditions in the external medium and, therefore, comes into the world more prepared for its difficult chicken life."

"AND, FINALLY, WHAT ABOUT THE DOLPHINS WHOSE LANGUAGE YOU HAVE BEEN STUDYING FOR A LONG TIME? WHAT NEW INFORMATION HAVE YOU BEEN ABLE TO FIND?"

"The dolphin has raised many curious questions for science, whose answers promise to be interesting as well as useful in practice. As far as their voice is concerned, scientists in this case take different positions. An extreme viewpoint of one position is expressed by the American researcher, John Lilly. He maintains that dolphins, having a developed intellect, are able to socialize among themselves in a special whistle language, are able to imitate human laughter and even speech sounds, seemingly knowing the meaning of the situation."

"The Soviet scientist, A.G. Tomilin, takes a more restrained position on this matter; he believes that dolphin language does not differ in principle in any way from the sound signals of other animals such as disaster, fear, hunger and other type signals. Moreover, Tomilin himself and some other scientists believe that the special language characteristic of the dolphins is their ability to combine separate sound elements and complex sequences of the "word" and "phrase" type.

"Incidentally, birds are also capable of this, however, the variety of sound signals, mainly the number of possible combinations, is immeasurably greater in dolphins. A similar structure of signals is characteristic for the communication systems of the so-called open type, whose number include human speech as well. Today, we can only assume that dolphins have a more complex language than other animals and that they find a more complex use for it. By the way, far more specific results have been attained in studying the hearing of dolphins and their echolocation apparatus than in studying their language. The problem has proved to be difficult, but, let us trust, not hopeless. Research is being conducted quite actively.

"MANY, UNDOUBTEDLY, ARE INTERESTED IN DATA ON THE LANGUAGE OF OTHER ANIMALS AS WELL. FOR EXAMPLE, ON THE LANGUAGE OF THE HIGHER MONKEYS. VLADIMIR PETROVICH, TO FILL THIS GAP IN OUR CONVERSATION, I REFER INTERESTED READERS TO YOUR NEW BOOK "AMUSING BIOACOUSTICS. STORIES ABOUT THE LANGUAGE OF EMOTIONS IN THE WORLD OF ANIMALS AND MAN", WHICH WAS RECENTLY PUBLISHED BY "ZNANIYE" AND AWARDED A PRIZE AT THE ALL UNION COMPETITION FOR THE BEST POPULAR SCIENTIFIC WORK IN THE "SCIENCE AND PROGRESS" SERIES. AND, THE LAST QUESTION: WHAT PRACTICAL APPLICATION WILL BE OBTAINED FROM THE RESULTS OF ANIMAL LANGUAGE RESEARCH?"

"Not, will be obtained, but have already been obtained. Today, even such terms exist as acoustic repellents and acoustic attractants. In the first case, we are talking about scaring birds from fields and airports with the assistance of translation, for example, the voices of birds of prey. The same method is used in the fishing industry. In the second case, bioacoustic methods are used for attraction, for example, fish to fishing equipment. The data on the echolocators of dolphins, bats and some birds are used in bionics for producing such complex things as an echo sounder, fish locator, "acoustic eye glasses" and other needed instruments. I am convinced of one thing: further penetration into the mysteries of the animal language will open for man truly fantastic potentialities."

12525
CSO: 1840/669

BIOPHYSICS

HUMAN EYE CAPABLE OF PERCEIVING PARTICLES

Moscow PRIRODA in Russian No 3, Mar 84

[Article taken from "Doklady AN SSSR" Vol 270, No 3, pp 725-727: "Single Electrons and Muons Evoke Visual Sensations"]

[Text] A current of ionizing particles, i.e., highly charged protons, muons, pions, etc., falling upon a human retina that has adapted to darkness is known to evoke visual perceptions.*

A.A. Arodzero, P.V. Gramenitskiy and I.N. Fetisov (Moscow Higher Technical School imeni N.E. Bauman) have studied the ability of the human eye to register solitary single-charged relativistic particles and have evaluated the effectiveness of the eye as a detector of such particles.

Studies were conducted with cosmic radiation particles in the mountains, at 3250 meters above sea level, where the charged component of radiation is comprised mainly of electrons (65%), muons, (30%) and protons (4%). A fundamental component of the experimental apparatus was the scintillation telescope with a system of detectors, including the eyes of the experimentor. The telescope registered particles that had passed through the retina. Comparison of the amplitude spectra of ionizing particles with calibrated ones indicated that visual perceptions in the form of spots, lines, clouds, etc., were evoked by solitary single-charged relativistic particles. The human eye was also to register these particles with 1-8% effectiveness.

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CSO: 1840/757

* See, for example: Grigor'yev, Yu.G., "Kosmicheskaya radiobiologiya" [Cosmic Radiobiology], Moscow, 1982.

DETERMINATION OF STRUCTURAL FEATURES OF BACTERIAL AND ANIMAL RHODOPSIN FROM HYDROPHOBICITY OF AMINO ACID RESIDUES

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 6 May 83) pp 383-388

TARAKHOVSKIY, Yu.S., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] In order to assess the putative mechanism by which rhodopsin is incorporated into plasma membrane, determinations were made of the distribution of hydrophobic amino acid side chains along the α -helix of bacterial and bovine opsin molecules. Hydrophobicity was evaluated in terms of the free energy of transfer of the amino acid residues from water into nonpolar solvents. Analysis of such data for the amino acids found in the respective molecules led to the identification of five hydrophobic amino acid regions in each protein, each region consisting of 20-28 amino acids. In addition, each opsin contained a hydrophobic sequence of 48-58 amino acids, along with long hydrophilic zones which imparted to the region amphipathic properties, and which is involved in retinal binding and rhodopsin formation. Reaction of retinal with lys-216 on the bacterial molecule favors incorporation into the membrane, in which the retinal-opsin binding becomes irreversible. A more complicated situation obtains with bovine opsin in which cysteine residues have a key role in incorporation and favor stacking of the six transmembrane segments, to which further structural rigidity is imparted by encirclement with 13 phenylalanine residues. Figures 5; references 8: 1 Russian, 7 Western.
[1512-12172]

KINETICS OF PHOTOINDUCED POTENTIAL DIFFERENCE IN BACTERIORHODOPSIN MODEL SYSTEM

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84 (manuscript received 20 Apr 83) pp 389-393

DYUMAYEV, A.K., SAVRANSKIY, V.V., VASIL'YEV, G.V., VLADIMIROVA, R.R. and MALINA, Z.A., Institute of General Physics, USSR Academy of Sciences, Moscow; Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Charge translocations in bacteriorhodopsin (BR) were evaluated for a model system consisting of *Halobacterium holobium* BR incorporated into

phosphatidylcholine liposomes subjected to 532 nm light pulses, approximately 15 nsec in duration, with an energy content approaching 15 mJ. Measurements at 23°C revealed five kinetically distinct stages with time constants of 10^{-6} to 10^{-1} sec, in addition to an initial unresolved stage. One pH- dependent stage was identified with a time constant of ca. 1 msec: at pH 7 the amplitude of the potential was approximately twice as great as at pH 4. That stage was attributed to pH-dependent functional alterations in BR rather than to an effect on the quantity of BR incorporated into the liposomes. The kinetically unresolved stage represented light-induced translocation of an electron along the retinal with resultant changes in the pK values of the various groups in the proximity of the chromophore. This was accompanied by energy transfer from the electron to a proton and resulted in proton translocation. Figures 1; references 15: 2 Russian, 13 Western.
[1512-12172]

ACTIVATION OF LIPOSOMAL CHEMILUMINESCENCE IN LIPID PEROXIDATION BY Tb^{+++}

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 16 Feb 83) pp 394-397

SHAROV, V.S. and VLADIMIROV, Yu.A., 2d Moscow State Medical Institute imeni N.I. Pirogov; Institute of Radiotechnology and Electronics, USSR Academy of Sciences, Moscow

[Abstract] Previous studies on chemiluminescence induced by lipid peroxidation were expanded to analyze the effects of Tb^{+++} on egg phospholipid peroxidation initiated by the addition of Fe^{++} . Addition of Tb^{+++} showed marked potentiation of the chemiluminescence resulting from lipid peroxidation following Fe^{++} addition, with increasing concentration of Tb^{+++} (up to 4×10^{-4} M in the system employed) intensifying the chemiluminescence and reducing the latent time. Since activation of chemiluminescence by Tb^{+++} was accompanied by a shift into the band representative of Tb^{+++} luminescence, it appears that the energy of chemical excitation was transferred from the excited products of lipid peroxidation to Tb^{+++} . Evaluation of the effects of pH and ionic strength on chemiluminescence indicated that the products of radical recombination (i.e., the primary emitters of chemiluminescence) and intermediate activators are "hidden" in the hydrophobic phase of the liposomal membrane, while Fe^{++} and Tb^{+++} are located in the aqueous phase adjacent to the membrane surface and are electrostatically bound by the negatively charged heads of the phospholipids. Figures 4; references 10: 7 Russian, 3 Western.
[1512-12172]

PICOSECOND DIFFERENTIAL SPECTROPHOTOMETRIC ANALYSIS OF DEACTIVATION KINETICS
OF EXCITED STATES IN RHODOSPIRILLUM RUBRUM CHROMATOPHORES ANTENNA

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 13 Nov 82; in final form 15 Jul 83) pp 398-402

BORISOV, A.Yu., GADONAS, R.A., DANELYUS, R.V., PISKARSKAS, A.S., RAZZHIVIN, A.P.
and ROTOMSKIS, R.I., Interfaculty Scientific Research Problems Laboratory
of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow
State University imeni M.V. Lomonosov; Vilnyus State University

[Abstract] Picosecond differential spectrophotometry was used in evaluation of the effect of redox state of active sites (AS) of *Rhodospirillum rubrum* chromatophores on the deactivation kinetics of the minor spectral form (B_m) with an absorption maximum at ca. 900 nm. Under conditions simulating natural photosynthetic processes the quantum yield of charge separation exceeds 0.5 when the energy of the 840 nm exciting light pulses (15-20 psec) is at least 3×10^{14} photons/cm² (i.e., less than absorbed quantum per AS). The measurements demonstrated that the deactivation kinetics of B_m of the chromatophore light-gathering antenna coincide with the kinetics of appearance of oxidized AS in the chromatophores. Saturation of the active sites with light or oxidation by means of ferricyanide had virtually no effect on the deactivation kinetics. The absence of an effect of the AS redox state on the deactivation kinetics in the present spectrophotometric study contradicts previous fluorescence measurement studies and current concepts on excitation transfer from the light-gathering antenna to the AS, particularly the model proposed by Vredenberg and Duisens [Nature, 197:355, 1963]
Figures 4; references 21: 9 Russian, 12 Western.
[1512-12172]

EFFECTS OF DEHYDRATION KINETICS OF *E. COLI* CELLS

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 14 Feb 83) pp 447-452

ANDREYEVA, O.V., BAGRYANTSEVA, Ye.A., BIZUNOK, S.N., POPOV, V.G. and
SVENTITSKIY, Ye.N., All-Union Scientific Research Institute of Especially
Pure Biopreparations, Leningrad

[Abstract] NMR and IR spectroscopic studies were conducted on *E. coli* cells subjected to dehydration to assess factors responsible for loss of viability under such conditions. Cells taken from the stationary phase of the growth curve were used in the form of a 15 mcm film exposed to forced gaseous nitrogen currents at room temperature. Velocity was adjusted to give 50 percent dehydration in 0.5, 1.5 or 4 min. Evaluation of the chemical shifts on ESR and IR patterns in the 6211-6803 nm range showed an increase in the relative

quantity of interacellular proteins with the β -pleated sheath structure with dehydration. Changes in the protein conformation did not occur until the quantity of bound water decreased by 50 percent, which also coincided with the point at which loss of viability became evident. It appears, therefore, that the key mechanisms responsible for *E. coli* inactivation was the loss of 50 percent of the bound water which resulted in marked structural alterations of proteins. Figures 5; references 17: 8 Russian, 9 Western.
[1512-12172]

MITOCHONDRIAL ADENYLATE TRANSLOCATOR CONTROL OF ATP PRODUCTION WITHIN PHYSIOLOGICAL RESPIRATORY RATE

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 22 Mar 83) pp 453-458

KHOLODENKO, B.N., Scientific Research Institute for Biological Testing of Chemicals, Kupavna, Moscow Oblast

[Abstract] A mathematical analysis was conducted on the relative contribution of the various mitochondrial enzymes to the regulation of oxidative phosphorylation, using the published data of Groen et al. [J. Biol. Chem., 257:2754, 1982]. The results obtained for isolated mitochondrial preparations indicate that within the physiological respiratory rate (30-50 percent of the maximum respiratory rate) the regulatory contribution of the adenylate translocator accounts for 90 percent of the ATP flux. Consequently the contribution of the other mitochondrial enzymes to the ATP flux is essentially insignificant within the physiological respiratory rate. Regulation of ATP production by the last enzyme in the sequence, i.e., the adenylate translocator, offers definite advantages to metabolic efficiency, since under such conditions the influx and efflux of intermediates has little effect on ATP synthesis. References 19 (Western).
[1512-12172]

NUCLEATION AND ICE GROWTH IN WINTERING FLOWER BUDS

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 11 Apr 83) pp 473-476

KRASAVTSEV, O.A., RAZNOPOLOV, O.N. and TERKULOVA, L.P., Institute of Plant Physiology imeni K.A. Timiryazev, USSR Academy of Sciences, Moscow

[Abstract] Ice formation in the different parts of flower buds was investigated by means of differential thermography which showed that the first exotherm occurred at -4 to -7°C in the case of the cherry, mazzard, peach, lungwort and asarum. This narrow temperature range was attributed to the presence of highly active crystallization inducers (nucleators) within the vascular tissue of the bud axis and in the intercellular space, with the

cells retaining viability. Further cooling is not accompanied by heat release initially, but at -20 to -30°C low-temperature exotherms appear, corresponding to the freezing and death of the rudimentary buds that thus far survived in the supercooled state. Death of the buds was ascribed to the low activity of the nucleators and the high viscosity of the bud contents, with rapid propagation of the ice crystals from cell to cell. Figures 1; references 19: 7 Russian, 12 Western.

[1512-12172]

TEMPERATURE EFFECTS IN ALTERED PERMEABILITY OF ERYTHROCYTE PLASMA MEMBRANE TO CATIONS AND WATER DURING SLOW FREEZING

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 7 Jan 83) p 502

GULEVSKIY, A.K., VOLKOVA, L.A., RYZHOV, V.G. and VOLKOV, V.Ya., Institute of Cryobiological and Cryomedical Problems, Kharkov

[Abstract] Radioisotope techniques and ESR spectroscopy were used to study the permeability of reconstructed erythrocytes to Na^+ , Rb^+ , Mn^{++} and H_2O after slow freezing in the 0 to -25°C range. Reconstructed erythrocytes frozen to -16°C and subsequently thawed lost only 8-10 percent of their ions, with water permeability being little affected as well. Freezing to -19°C and below and subsequent thawing resulted in almost complete loss of the mono- and bivalent cations. Evidently, membrane defects sufficient to cause the loss of water and cation molecules occurred at temperatures corresponding to complete crystallization of intraerythrocytic water. (The article has been deposited in full with VINITI, No 1150-84, 29 Feb 84).

[1512-12172]

FREE RADICALS OF ASCORBIC ACID AND GLUCOSE IN DRIED BIOLOGICAL OBJECTS AFTER THERMAL TREATMENT

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 12 Jan 84) p 503

NAKTINIS, I.I. and TSIMBOLAYTITE, Yu.Yu., Scientific Research Institute of Cardiovascular Physiology and Pathology, Kaunas Medical Institute, Kaunas

[Abstract] Dried tissues and blood were evaluated for the effects of thermal treatment on the formation of free radicals. Maximum formation of free radicals from ascorbic acid occurred at 50-70°C; formation abated at higher temperatures approaching 130°C. Formation of free radicals from glucose, however, was favored by high temperatures (120-140°C) in the case of blood samples. Free radicals were also formed from galactose and fructose monosaccharides added to the blood, as well as from the disaccharides maltose and lactose. Free radicals were not formed from the disaccharide sucrose or the polysaccharide starch. (The article has been deposited in full with VINITI, No 1145-84, 29 Feb 84).

[1512-12172]

BIOTECHNOLOGY

BIOCHEMISTRY EXPOSITION VIEWED IN MOSCOW

Moscow GUDOK in Russian 1 Jul 84 p 3

[Article by Yu. Vereshagin: "Biochemistry 84" under the heading "Expositions". Passage rendered in all capital letters printed in boldface in source.]

[Text] THE EXPOSITION "INSTRUMENTS, EQUIPMENT AND REAGENTS FOR CONTEMPORARY BIOCHEMISTRY--BIOCHEMISTRY 84" HAS OPENED AT THE KRSNAYA PRESNA EXPOSITION COMPLEX IN MOSCOW. ABOUT 300 COMPANIES AND ORGANIZATIONS FROM 21 COUNTRIES ARE TAKING PART IN THE INTERNATIONAL SHOW.

In contemporary biology there have been a number of outstanding discoveries furthering the resolution of such important problems as the prevention and treatment of dangerous diseases, the supplementation of food resources, the protection of the environment and the rational use of natural riches.

The exposition "Biochemistry 84" presents to the scientific community the achievements of national and international science and instrument building in the sphere of modern physicochemical biology and biotechnology.

One example of the latest achievements in national biological science is the KhZh-1309 laser liquid chromatograph exhibited in the Soviet section.

"This is the first microcolumnar chromatograph in world scientific instrument building," says one of its developers, V. Shevkunov, associate of the Instrument Building SRI, USSR Academy of Sciences. "In April of this year the instrument was demonstrated for the first time at the international exposition 'Analytical Chemistry 84' in Munich and evoked great interest among scientists. Many purchase offers were made. A feature of the new development is that it makes possible rapid, very exact microscopic investigation of small particles of a substance without loss from the substance."

At this exposition Hungarian specialists from the "Labor MIM" production unit are demonstrating, among other items, an agrochemical laboratory equipped with a standard 5-ton container. Although mounted on a KamAZ vehicle, such a laboratory, as one can readily infer, can be transported on a railroad platform, aboard ship or "hanging" from a helicopter.

The laboratory is equipped with everything required for the investigation of soils and plants. The interior walls of the container are heated. Besides, it has automatic heating, power supply, and ventilation devices.

Naturally, the living cell cannot be seen by the unaided eye. But under a microscope with thousandfold or 500-thousandfold magnification? The West German company "Opton" brought to Moscow a whole family of microscopes, with whose aid, in addition to observation, photographing of an image on photographic film or its reproduction on a TV screen become possible.

Scientific experiments often require a liquid medium with a strictly maintained temperature. At its stand the British "Techne" company demonstrates laboratory vats in which the temperature of the liquid medium is regulated up to 1,100 degrees centigrade.

The liquid medium is a mass of aluminum oxide particles with the property that it does not come to a boil, freeze, or evaporate.

The Finnish company "Orion" has participated in many international expositions in the USSR. It produces pharmaceuticals, diagnostic apparatus and analyzers. Over 10% of its production is exported to the USSR. In the last decade alone deliveries to our country have increased to 30 times the previous value. At this show "Orion" is displaying x-ray apparatus for the most varied purposes, rapid tests for determining a number of diseases and a gas chromatograph with microprocessor control. The last of these is intended for chemical monitoring of raw materials and production quality in the food industry, analysis of the environment and other investigations.

In connection with the planned "dispensarization" of our population, diagnostic apparatus for large numbers of patients evokes the special interest of medical specialists. Our long-standing trade partner, the Japanese company "Iskra", for example, displays to visitors an analyzer to determine a patient's tendency to diabetes. Here the new "Olimpas" endoscopes, facilitating noninvasive research in the human gastrointestinal tract, are also features.

"Johnson and Johnson", a debutante from the USA, presented at its stand the so-called "Spectrum 3" cell sorter. By examining leukocytes with its help physicians can not only establish whether a patient is healthy but also "manage" certain diseases.

The Biochemistry 84 exposition is considered by specialists to be an excellent training ground for perfecting knowledge and strengthening business contacts.

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CSO: 1840/740

CYANOBACTERIA IN GENETIC ENGINEERING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Jul 84 p 4 (6)

[Excerpt from article by A. Koryagin, "On the Road to Biomedical Industrial Plants"]

[Excerpt] Science has already conquered an important bridgehead in cellular engineering, particularly in the cellular engineering of plants. Let us say that the healthiest, most vital cells can be taken from any part of a plant, and that whole plants can be cultivated from them, possessing great resistance to diseases and unfavorable climatic conditions, characterized by high yield and an increased level of nutrient substances. This is a stage that has already been covered, but this method does not change the cell itself. A definite program of development is built into it, which nature has been polishing for millions of years. In order to impart new useful properties to the plants, it is necessary to "correct" this program--to introduce new information to the genetic memory of the cell. Just how can this be done?

"We have solicited the aid of Cyanobacteria," [responded T. Korzhenevskaya, Moscow State University]. "Placed in the same nutrient medium with cells of cultivated plants, they first stimulate their division and increase their capacity to multiply. In other words, they act as a catalyst in their own way. Secondly, having colonized in the plants, the Cyanobacteria introduce their own 'corrections' to the [plant] functions. This symbiosis with microorganisms imparts completely new properties to the plants, including the capacity to assimilate nitrogen directly from the air, thus doing without fertilizers..."

"Is this not, however, too cumbersome a chain? [Koryagin interposes] "You have to isolate the cell from the plant, put it into the nutrient medium with Cyanobacteria, having established the appropriate conditions therein. Then you must wait until it attains new properties by multiplying. After this you must again cultivate from it a plant and obtain progeny from it..."

"This is not at all as cumbersome as it seems, especially since in a number of cases it is not at all necessary to follow the entire method: the chain can be cut in half..."

Sometimes human needs do not require entire plants, but only certain substances developed in the roots, stems or leaves.

Would it not thus be simpler to place isolated cells in the nutrient solution and force them to live, multiply and synthesize the substances needed? In other words, to construct their own kind of biological manufacturing plants...

The production of ginseng cells for the perfume industry has been organized according to this principle, under the management of R.G. Butenko, corresponding member of the USSR Academy of Sciences, and technologies for the use of other plant cells which are used in the production of valuable pharmaceutical preparations are being developed.

12262
CSO: 1840/1537

UDC 577.154

ENZYMATIC CELLULOSE HYDROLYSIS: COMPARATIVE ASSESSMENT OF DIFFERENT LABORATORY EQUIPMENT

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 20, No 1, Jan-Feb 84 (manuscript received 10 Aug 82) pp 55-63

GUSAKOV, A.V., NADZHEMI, B., SINITSYN, A.P. and KLESOV, A.A., Moscow State University; Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] A comparative analysis was made of the efficiency of different reaction techniques used for the enzymatic breakdown of cellulose, employing cellulase preparations obtained from *Trichoderma longibrachiatum*, *T. virile*, *T. koningii* and *Geotrichum candidum*. Evaluation of the different techniques demonstrated that in terms of efficiency and convenience the column method was superior to a batch method and a reaction vessel with continuous magnetic stirring, both in terms of degree of conversion and glucose concentration. To a certain extent, the efficiency of the column technique was due to elimination of product inhibition, with the rate of conversion of certain fungal preparations reaching 90%. An added advantage of the column method was enzyme recovery. A key disadvantage of column method is the requirement for cellulase preparations that show a high degree of adsorption to the substrate. Figures 3; references 14: 7 Russian, 7 Western.
[1515-12172]

UDC 577.154.21

SELECTION OF INITIAL ENZYME RATIOS IN IMMOBILIZATION OF MULTIZYME SYSTEMS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 20, No 1, Jan-Feb 84 (manuscript received 20 Sep 82) pp 74-78

MORKYAVICHENE, M.B., DIKCHYUVENE, A.A., PAULYUKONIS, A.B. and KAZLAUSKAS, D.A., All-Union Scientific Research Institute of Applied Enzymology, Vil'nyus

[Abstract] Kinetic studies are presented for the construction of an immobilized enzyme system consisting of invertase, mutarotase and glucose oxidase in order to assure maximum productivity (= activity x stability).

Evaluation of the data in terms of K_m and V_{max} values for preparations coupled to Silochrome-2.5 showed that maximum activity was obtained with an initial invertase:mutarotase:glucose oxidase ratio of 1:1:1. In each situation the reaction was limited by the enzyme whose concentration was below the optimum level in the system. The mathematical approach outlined can be used for preliminary assessment of other systems. References 10: 5 Russian, 5 Western. [1515-12172]

UDC 577.15.062

IMMOBILIZATION OF TYROSINE PHENOL-LYASE-ACTIVE CITROBACTER FREUNDII CELLS IN NATURAL GELS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 20, No 1, Jan-Feb 84 (manuscript received 5 May 83) pp 79-87

TYSYACHNAYA, I.V., RODRIGES, M.Kh., YAKOVLEVA, V.I. and BEREZIN, I.V., Moscow State University

[Abstract] Comparative studies were conducted on the immobilization of tyrosine phenol-lyase-active (TPL; EC 4.1.99.2) *Citrobacter freundii* cells in various natural gels, in order to test such systems for utility in tyrosine production. Immobilization in glutaraldehyde-treated 5, 10 and 15% gelatin gels yielded samples that retained only 25-49% of the initial enzymatic activity, while entrapment in agar and agar-agar gels (5 or 7%) resulted in preparations with up to 60% of the initial activity. Highest retention of TPL activity was obtained with 2-10% carrageen preparations, with the different preparations retaining 58-97% of the original activity. This system was also remarkable for its high entrapment efficiency (70-90%). Carrageen was thus found to be the most effective medium for immobilization of *C. freundii* cells with high retention of TPL activity, and possessed satisfactory physicomechanical properties which facilitate the use of the system for tyrosine production. Figures 4; references 23: 9 Russian, 14 Western. [1515-12172]

UDC 577.158

TRANSITION METAL ION-MEDIATED IMMOBILIZATION OF PROTOSUBTILIN ON ALUMINUM OXIDE

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 20, No 1, Jan-Feb 84 (manuscript received 28 Sep 82) pp 88-94

KHODAKOVSKAYA, Zh.M., DENYAKINA, Ye.K., NEKLYUDOV, A.D. and MIRKINA, M.Z., All-Union Scientific Research Institute of Technology of Blood Replacements and Hormones, Moscow.

[Abstract] Various parameters influencing the efficiency of protosubtilin G10x adsorption to aluminum oxide were investigated in terms of $TiCl_2$ pretreatment

(activation) of Al_2O_3 , buffer system, and protein concentration. X-ray phase analysis and IR spectroscopy were used to evaluate structural changes in the carrier as a result of TiCl_2 treatment, and indicated that the type and concentration of Ti-O bonds on the carrier were the primary factors affecting protosubtilin binding. The optimum system for adsorption of protosubtilin to $\gamma\text{-Al}_2\text{O}_3$ consisted of pretreatment of the carrier with 2% TiCl_2 in 15% HCl for 15 min at room temperature, followed by exposure to protosubtilin in a concentration of 0.5 mg/g carrier in 0.2 M calcium acetate buffer. The final preparation showed an activity of ca. 0.92 U/g carrier, with a specific activity of 1900 U/g protein of a preparation containing 0.52 mg of protosubtilin per gram of carrier. Figures 7; references 14: 10 Russian, 4 Western.
[1515-12172]

RESOLUTION BY GENERAL ASSEMBLY OF USSR ACADEMY OF SCIENCES: SECTION ON
CHEMICAL ENGINEERING AND BIOLOGICAL SCIENCES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 84 pp 52-53

[Abstract] A resolution by the General Assembly of the USSR Academy of Sciences took note of the great advances in research made by the Section on Chemical Engineering and Biological Sciences, and indicated the direct contributions made to the Soviet Food Program and the Energy Program. Concomitantly, however, note was taken of the fact that many fundamental questions are neglected, research projects are poorly coordinated, and practical implementation of research findings is proceeding at an inadequate pace. The Section should devote more attention, efforts, and resources to such problems as fine organic synthesis, biotechnology (encompassing as it does pharmaceutical and food microbiology, genetic engineering, industrial enzymology, etc), the development of new materials, and ecology as a theoretical component in studies on utilization of biospheric resources and nature protection.
[725-12172]

EPIDEMIOLOGY

UDC 579.842.14:579.252.55:615.33

CONJUGATIVE R-PLASMID ANTIBIOTIC RESISTANCE IN SALMONELLA

Moscow ANTIBIOTIKI in Russian No 4, Apr 84
(manuscript received 13 Sep 83) pp 249-253

GRIDNEV, V.A., Khabarovsk Scientific Research Institute of Epidemiology and Microbiology

[Abstract] An assessment was made of bacteriological data pertaining to R-plasmid dependent antibiotic resistance in salmonella in the Soviet Far East, covering the period 1968-1982. Based on the information obtained for 4801 isolates, belonging to 67 serovars isolated from patients and carriers, animals and birds, and inanimate objects, antibiotic resistance to 12 common antibiotics (benzylpenicillin, tetracycline, chloramphenicol, neomycin, etc.), showed a decrease from 42.3 to 13.4 and 6.60% in three sequential five-year periods. In terms of group specificity 0.8% of the isolates belonged to group A, 84.6% to group B, 6.4% to group C, 5.8% to group D, 2.0% to group E and other groups accounted for 0.4% of the isolates. Transmission of antibiotic resistance was observed in 16 of the 67 serovars following conjugation with salmonella strains showing resistance to 4-10 antibiotics. *S. typhimurium* strains isolated from hospital infections were remarkable for the poly-resistance and possessed the greatest variety of R-plasmids. The degree of resistance was also determined by the individual R plasmids, with the highest resistance evident in the case of benzylpenicillin, chloramphenicol and erythromycin, and the least to tetracycline. References 7 (Russian). [716-12172]

UDC 579.843.1:579.252.55:615.33

ANTIBIOTIC RESISTANCE OF CHOLERA VIBRIO: PREVALENCE AND PROGNOSIS

Moscow ANTIBIOTIKI in Russian No 4, Apr 84
(manuscript received 13 Sep 83) pp 260-263

VED'MINA, Ye.A., GIVENTAL', N.I., SOBOLEV, V.R., OGNEVA, N.S. and VORONIN, Yu. S., Chair of Microbiology, Central Order of Lenin Institute for the Advanced Training of Physicians, Moscow

[Abstract] Data obtained on the prevalence of drug-resistance *El Tor* vibrios in the USSR was combined with similar findings published for other countries to assess the current status of antibiotic resistance in this microorganism.

While in the sixties and early seventies, susceptibility to a wide variety of antibiotics was the rule, currently isolated strains show R-plasmid dependent resistance to a number of the more common antibiotics. To a large extent the current situation is predicated on past practice of extensive use of tetracycline for the control and prevention of cholera outbreaks. This has resulted in the identification of R plasmids from C group in other compatibility groups, and emphasized the need for detailed genetic and biochemical analysis of the resistance factors, and the need for limitations on indiscriminate use of antibiotics for mass prophylaxis. References 19: 7 Russian, 12 Western.

[716-12172]

UDC 616.98:579.852.11]-07:616-008.9

ENERGY METABOLISM AND GAS EXCHANGE DURING TETANUS INTOXICATION

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 2, Mar-Apr 84 (manuscript received 7 Jun 82) pp 61-65

ALEKSEYEVICH, Ya.I., LUCHKO, A.S., TIMOCHKO, M.F., MYSAKAVETS, A.G. and MARTYNYUK, V.B., L'vov Medical Institute

[Abstract] Degree of change of metabolism, utilization of carbohydrates and lipids as main energy substrates, determination of catecholines level, respiratory enzyme activity and oxygen consumption in the dynamics of experimental tetanus intoxication were studied after intrrafemoral injection of lethal doses of tetanus toxin into 23 dogs, 15 rabbits and 120 white rats. Changes observed in all of these indicators signify that tetanus toxin is incorporated into the bioenergetics of the macroorganism long before appearance of typical spasmic syndrome caused by suppression by the toxin of output of inhibiting mediators into cells of the central nervous system. Some changes of the internal organs do not depend on the central effect of the toxin.

Figure 1; references 19: 14 Russian; 5 Western.

[685-2791]

UDC 618.14:616.16-008.1+616.16.16-008.1-031.611.66

MICROCIRCULATION IN UTERINE SEROUS COAT OF INTACT RATS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL TERAPIYA in Russian No 2, Mar-Apr 84 (manuscript received 19 Apr 83) pp 66-67

ORLOV, V.I., and OVSYANNINKOV, V.G., Department of Obstetrics and Gynecology No 1 (Head of the Department, docent E.A. Kovaleva), Department of Pathologic Physiology (Acting Head of the Department, V.G. Ovsyannikov), Rostov Medical Institute

[Abstract] Contact microscopic study of the microcirculation in the uterine serous coat of 50 intact, non-pregnant rats (200-300 g) showed that the

microvascular channel of the uterine serous coat of the rats involves all of its elements. Blood flow in the uterine vessels is distinguished by its asynchronicity and vasomotor reactions have a complex nature. Vasomotions of the vessels are associated with operation of sphincters of precapillaries and arterioles. The number of functioning capillaries does not exceed 50 percent of their total number in the field of vision. Figures 2; references 6 Russian.
[695-2781]

UDC 616.993.162

CUTANEOUS LEISHMANIASIS

Alma Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 5, May 84, p 70

AKIMOCHKINA, R.G. and DERBINSKAYA, G.M., Head of the Department, Docent R. G. Akimochkina, Department of Skin and Venereological Diseases, Karaganda Medical Institute

[Abstract] Errors in diagnosing cutaneous leishmaniasis sometimes occur in people contracting the disease in UzSSR but examined in other republics. One such case is described. An illness developing after a hunting trip in Bukhara was diagnosed as pyoderma. Examination of the patient, 25 years old, revealed ulcers localized on extremities of the left side and in the region of the spine. Acute necrotizing leishmaniasis was diagnosed. Treatment included use of 50 percent solution of potassium permanganate, 10 percent monomycin ointment and sulfadimetoxin. The last ulcer scarred after two weeks of treatment. References 2 (Russian).

[688-2791]

SEROLOGICAL AND BACTERIOLOGICAL DETECTION OF TULAREMIA IN TICKS AND RODENTS

Alma Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 5, May 84, pp 48-49

AVER'YANOVA, S.A. and PUGIN, P.K., Tselinograd Oblast Sanitary-Epidemiological Station (Chief Physician, V.I. Govorkov)

[Abstract] Comparison of serological and bacteriological methods of detecting tularemia in ticks and small rodents involved parallel study of 14,000 cattle ticks and 132 small rodents by these methods. Practical identity of results obtained by both methods justifies addition of use of the serological method to the traditional bacteriological method during study of natural foci of tularemia in order to increase the efficiency and effectiveness of such a study.

[686-2791]

UDC 616-002.72-036.12-02:579.841.93:579.253.4

MORPHOGENESIS OF CHRONIC GRANULOMATOUS INFLAMMATION DURING VARIABILITY OF BIOLOGICAL PROPERTIES OF CAUSATIVE AGENT

Moscow ARKHIV PATOLOGII in Russian Vol 46, No 2, Feb 84 (manuscript received 28 Mar 83) pp 57-63

KONONOV, A.V., Novosibirsk, and ZINOV'YEV, A.S., Omsk, Department of Pathological Anatomy (Head of the Department, professor A.S. Zinov'yev), Omsk Medical Institute; Laboratory of Pathology of Connective Tissue (Head of the Department, doctor of medical sciences G.I. Nepomnyashchikh), Institute of Clinical and Experimental Medicine, Siberian Department, USSR Academy of Medical Sciences

[Abstract] Morphogenesis of granuloma as basis of the infectious process during dissociation of the causative agent was studied during experimental brucellosis, induced in guinea pigs by R-strain of *B. abortus bovis* and compared with S-form of brucellosis in guinea pigs infected with strain No 544. Granulomatous inflammation in animals infected by the R-strain was greatly reduced and granulomas were smaller. Inflammation in this case occurred against a background of reduced cellular immunity without attaining the stage of epitheliocellular granuloma, the so-called Bang tubercle, typical of brucellosis infection. Granulomas caused by R-forms of brucelloses are found, for the most part, in the regional lymph nodes, forming a barrier to infection and also a place of maximum length of persistence of the causative agent. Combination of reduced granulomatosis and reduced cellular immunity results in asymptotic or mild forms of the disease. It is assumed that pathomorphosis of the infectious disease in this case is caused by variability of the causative agent and is due to realization of only part of the phylogenetically-accruing tissue reactions in the causative agent with changed biologically properties. Figures 2; references 24: 11 Russian; 13 Western. [687-2791]

UDC 616.98:579.852.13-036.1(048.8)

PNEUMONIA AS ONE CAUSE OF DEATH IN PATIENTS WITH GRAVE FORMS OF BOTULISM

Moscow SOVETSKAYA MEDITSINA in Russian No 4, Apr 84 (manuscript received 30 Sep 83) pp 55-58

NIKIFOROV, V.N., NIKIFOROV, V.V. and KAGANSKIY, M.A., Department of Infectious Diseases (Head of Department, Professor V.N. Nikiforov, Central Order of Lenin Scientific Research Institute For Advanced Training of Physicians, Moscow

[Abstract] Dynamics of development and possible links in pathogenesis of fatal pneumonia were studied from 1974-1983 in observations of 12 botulism patients (5 men and 7 women) ranging in age from 19 to 60 years. Clinical picture indicated clearly-pronounced classical cases of grave forms of botulism intoxication. Death occurred against a background of cardiopulmonary

insufficiency. Factors presently known to contribute to fatal pneumonia during botulism are presented. In view of the fact that pneumonia during botulism does not always prove to be fatal, it is assumed that fatal pneumonia is closely associated with the toxin dose causing the disease. High dose of toxin can also cause cardiac arrest. The brief incubation period and rapid rise of acute respiratory insufficiency in the patients studied indicate the connection between large doses of toxin and fatal pneumonia. References 17: 13 Russian; 4 Western.

[769-2791]

UDC 616.4-036.21-07(470)

CURRENT EPIDEMIOLOGY OF INFECTIONS RELATED TO NATURAL FOCI IN THE RSFSR

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 23 Nov 83) pp 17-21

IVANOVA, L.M., Main Sanitary-Epidemiological Administration, RSFSR Ministry of Health, Moscow

[Abstract] Existence of nearly 20 infectious and parasitic diseases in the RSFSR has been established. The most important in epidemiological significance are: tick-borne encephalitis, hemorrhagic fever with renal syndrome, leptosirosis and tularemia. Incidence and range of occurrence of these diseases in 11 economic and geographical regions of the RSFSR are discussed. Dynamics of morbidity of these diseases from 1969-1983 are presented and discussed. Changes in epidemiology of these diseases in recent years are explained and discussed.

[696-2791]

UDC 616.9-022.39-036.2.911.3

BIOGEOGRAPHY, MEDICAL GEOGRAPHY AND THEORY OF NATURAL FOCALITY OF DISEASES OF MAN

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 20 Sep 83) pp 28-33

VORONOV, A.G., Geography Faculty, Moscow State University

[Abstract] Development of the concept of natural focality as a very important section of medical geography is discussed with emphasis being placed on the vital importance of knowledge of medicine, biology and geography in relation to development of this concept. Foci of diseases are discussed in three groups: foci created by man, natural foci transformed by human activity and natural foci unchanged or only slightly changed by man. Anthropogenic effects on the natural environment are so diverse that it is impossible to

present a unified concept which is relevant to all foci. Knowledge of medical geography, biogeography and landscape geography can be used to contribute to solutions of problems promoting elimination of natural foci of diseases.

References 10 Russian.

[696-2791]

UDC 576.895.7.095.3

FEATURES OF DEVELOPMENT AND FEEDING OF BLOOD-SUCKING ARTHROPODS WHICH ESTABLISH THEM AS SPECIFIC CARRIERS OF CAUSATIVE AGENTS OF DISEASES

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 25 Oct 83) pp 34-39

ALEKSEYEV, A.N., Institute of Medical Parasitology and Tropical Medicine imeni Ye.I. Martsinovskiy, USSR Ministry of Health, Moscow

[Abstract] Some parameters which permit or prohibit development of pathogens of diseases in blood-sucking arthropods and some factors which determine their establishment as specific disease carriers are described and discussed. Relationships between the systematic position of carriers, peculiarities of their metamorphosis and feeding in the preimagal and imagal stages and the capacity for specific transmission of pathogens of transmissible diseases by vertebrates and man are tabulated and discussed. Factors studied include the nature of metamorphosis, presence of peritrophic membrane in larvae and imago, the composition of food used by the imago and the rate of digestion of blood by the adult insect and the presence of symbiont bacteroids in their intestine. Blood-sucking insects with complete metamorphosis and presence of a peritrophic membrane in the imago phase cannot be rickettsia carriers. References 28: 17 Russian, 11 Western.

[696-2791]

UDC 616.98:576.834.114]-022.39:576.894.421

MOST IMPORTANT SCIENTIFIC AND PRACTICAL PROBLEMS ASSOCIATED WITH TICK-BORNE BORRELIOSES

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 84 (21 Nov 83)
pp 39-45

KORENBERG, E.I. and SERGIYEV, V.P., Scientific Research Institute of Experimental Medicine imeni N.F. Gamaleya, USSR Academy of Medical Sciences; Main Administration of Quarantine Infections, USSR Ministry of Health, Moscow

[Abstract] Data from the literature are presented in an analysis of the present status of the problem of tick-borne borrellosis in the USSR and some major problems encountered in its study and prophylaxis are mentioned. Etiology, diagnosis, clinical course, spread, epidemiology and epizootiology and prophylaxis of the disease are discussed. Improvement of control of borrellosis requires close collaboration between research workers and practical public health workers. References 39: 28 Russian, 11 Western.

[696-2791]

UDC 616.993.161-07+616.993.161-084

CURRENT PROBLEMS OF STUDY AND PROPHYLAXIS OF LEISHMANIASES

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 23 Nov 83) pp 45-51

SAF'YANOVA, V.M., Scientific Research Institute of Experimental Medicine imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Discussion of some key aspects of study and prevention of leishmaniasis is based on a review of the literature with major emphasis on consideration of causative agents of the disease, parasitic systems contributing to incidence of leishmaniases, immunology, problems of non-specific diagnosis and non-specific prophylaxis of the disease. A unified, complex program involving scientific and medical personnel must be implemented to improve control of leishmaniases. References 32: 19 Russian, 13 Western.
[696-2791]

UDC 579.843.95:579.26

RESULTS OF EXPERIMENTS IMITATING PRESERVATION OF PLAGUE CAUSATIVE AGENT UNDER NATURAL CONDITIONS

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 13 Jul 82) pp 64-68

SVIRIDOV, G.G., NOVIKOV, G.S., ARAKELYANTS, V.S., TLEUGABYLOV, Kh.M., DUBOVITSKIY, N.M., NOVIKOVA, T.A., KLASOVSKIY, L.N. and SOLDATKIN, I.S., Taldy-Kurgan Plague Control Station

[Abstract] Results of experiments performed to check the possibility of persistence of plague causative agent in isolated large gerbil burrows, in sand below burrows and in terrariums for periods approximating those found in nature are presented and discussed. Plague microbes were preserved on *Xenopsylla* feas and *Argas* ticks under conditions approximating those found in gerbil burrows. There were isolated cases of preservation of plague causative agent for 2 or 2½ years but, as a rule, sterilization of the burrows occurred within the first months as occurs in nature. Rarity of cases of prolonged preservation of plague causative agent, discrepancy between the duration of its preservation and duration of interepizootic periods in a focus and rarity of occurrence of infection of gerbils from the sand substrate studied cast doubt on some accepted ideas concerning pathways of preservation of plague causative agent in non-epizootic years.
[696-2791]

UDC 616.98:578.833.26]-092-092.9

EXPERIMENTAL STUDY OF INTERRELATIONSHIPS OF VERTEBRATES WITH VIRUS TICK ENCEPHALITIS. REPORT SMALL MAMMALS

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 24 Apr 83) pp 83-86

NAUMOV, R.L., CHUNIKIN, S.P. and GUTOVA, V.P., Institute of Medical Parasitology and Tropical Medicine imeni Ye.I. Martsinovskiy, USSR Ministry of Health; Institute of Poliomylitis and Viral Encephalitides, USSR Academy of Medical Sciences

[Abstract] Analysis of data in the literature indicates that practically all dominant species that are most important hosts of ticks in European and Siberian tick-encephalitis foci may participate in circulation of the virus. Some strains of each of these species may serve as an elimination factor since they do not exhibit viremia in titers high enough to infect ticks nor transmission of virus by them in the course of development. It is assumed that the strain composition of virus populations in foci depend, to a large extent, on the species composition and dominance of small animal species serving as the major hosts of ticks. References 24: 13 Russian; 11 Western. [696-2791]

UDC 616.98:578.833]-036.21(47+57)(048.8)

NATURAL-FOCAL VIRUS DISEASES OF MAN WHICH ARE NEW FOR USSR (REVIEW OF THE LITERATURE)

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 23 Nov 83) 86-92

L'VOV, D.K., SIDOROVA, G.A., GROMASHEVSKIY, V.L. and SKVORTSOVA, T.M., Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] New data concerning natural-focal virus diseases indicate that 8 out of 31 arboviruses newly discovered or found in the USSR for the first time may cause febrile disease in man or even epidemic outbreaks. Data indicating presence of antibodies in human blood of 4 other viruses are reported. Public health workers must consider these data during diagnosis and prophylaxis work and in sanitation-educational work. References 58: 42 Russian; 16 Western. [696-2791]

FOOD TECHNOLOGY

EQUIPMENT FOR SOVIET FOOD INDUSTRY PURCHASED IN FRANCE

Moscow ECOTASS No 15, 9 Apr 84 p 5

[Text] A delegation of the Soviet foreign trade association "TECHNOPROMIMPORT" has recently visited Paris where they signed a contract with "CIFAL" for the purchase of a large amount of machines and equipment for modernizing the Volkovysk canned milk plant in Byelorussia. After the modernization (it is to be completed in three years), the daily capacity of the plant will reach 20 tons of ready product. The plant will produce powder milk mixtures for the two types of baby food--"Malyutka" and "Malysh". This project is connected with the implementation of the USSR Food Program.

A TASS correspondent has been told at "TECHNOPROMIMPORT" that the association established business relations with "CIFAL" in 1956. Since that time the French firm has repeatedly delivered to the USSR complete equipment for enterprises producing instant baby food, large consignments of machinery for the production of grape juice and for bottling sparkling wines at the enterprises of Moscow, Tbilisi, Yerevan, Khabarovsk, Gorky and Togliatti. "CIFAL" also delivered to the USSR production lines for sorting vegetables, for cleaning potatoes from soil, as well as other kinds of machinery for the food and spices production.

The equipping with the French machinery of four Soviet baby food-producing enterprises several years ago were major projects of cooperation between "TECHNOPROMIMPORT" and "CIFAL". The enterprises are situated in Istra (the Moscow region), Gagarin (the Smolensk region), Khorola (the Ukraine) and Volkovysk (Byelorussia). They have reached design capacity already.

According to the latest contract, specialists from "CIFAL" will take part in the contract supervision at the Volkovysk plant. The equipment for the plant will be delivered from July 1985 to January 1986.

CSO: 1852/13

BRIEFS

DIETICIANS SEARCH FOR PROTEIN SOURCES--The workers of the Kokand fats and oils combine have gathered extensive experience on effective use and complex processing of cottonseed, soya and fruit pits, lowering the loss of oil in production and saving raw materials and auxiliary materials. A technological system for the obtaining of oleic acid--a valuable product for different branches of the economy--from waste products has been worked out and introduced in collaboration with scientists. Work has now begun to launch the first experimental industrial station in the country for extraction of edible protein and industrial phytin from cotton hulls. The process of direct extraction of oil in processing of soy beans has been established at the enterprise, as has the extraction of oil from grape seeds.

The experience of this enterprise is a focus of the attention of participants in the All-Union conference of workers in the fats and oils industry which opened in Kokand on June 8. Distinguished specialists in the branch from the Central Asian republics, Kazakhstan and the Caucasus, who represented scientific research and planning and construction institutes, as well as food ministers of the republics and the USSR are discussing the future methods of increasing efficiency in using oil raw materials and the rational utilization of waste products of the oil and fats enterprises. [Text] [Tashkent PRAVDA VOSTOKA in Russian 9 Jun 84 p 2] 9582

CSO: 1840/732

UDC 612.281-07

PRINCIPLES AND METHODS OF HYGIENIC EVALUATION OF NEW PROTEIN PRODUCTS

Moscow VOPROSY PITANIYA in Russian No 2, Mar-Apr 84
(manuscript received 3 May 83) pp 3-7

MAYSTRUK, P.N., SOLOMKO, G.I. and SOKOLOVA, A.G., Kiev Scientific Research Institute of Nutritional Hygiene, UkrSSR Ministry of Health

[Abstract] Currently, one of the nation's principal tasks is to expand protein resources. New sources of nutritional protein are sought and the technology of production of new protein food is being developed. In the present paper, the authors review studies of the quality of new protein products: biological properties, composition of aminoacids, taste, odor, consistency, etc. In vitro and in vivo experiments on rats are recounted concentrating on the rat model. Genetic and carcinogenic investigations of novel products are noted. References 24: 16 Russian, 8 Western.
[693-7813]

UDC 613.953.13 + 613.287.54]-053.3-078

MEDICAL ASPECTS IN DEVELOPMENT OF MICROBIOLOGICAL CRITERIA OF EVALUATING QUALITY AND OF PRINCIPLES OF MICROBIOLOGICAL STANDARDIZATION OF DRY MILK AND OTHER MIXTURES FOR INFANTS DURING THEIR FIRST YEAR OF LIFE

Moscow VOPROSY PITANIYA in Russian No 2, Mar-Apr 84
(manuscript received 5 Oct 82) pp 7-11

KUVAYEVA, I.B., Laboratory of Sanitation-Food Microbiology and Microecology, Institute of Nutrition, USSR Academy of Medical Sciences, Moscow

[Abstract] General aspects of microbiological criteria were analyzed on the example of dry milk and other mixtures for infants' consumption. Experimental results were reported showing that all potentially-pathogenic, opportunistic microorganisms which were examined survived in the experimental media corresponding to physiological parameters of an infant's stomach during its first year of life. These organisms multiplied actively upon addition of the dry mix "Malysh" exceeding the infection dose 5-10 fold. It was shown that

criteria adapted for food products designed for adult consumption cannot be used in foods for the infants. Standards were listed based on assays of mesophilic aerobic and facultatively anaerobic microorganisms: the final products should contain no coliform bacteria fermenting lactose, no *E. coli*, no coagulase positive staphylococci (*St. aureus*), no salmonella, yeasts or molds. References 23: 12 Russian, 11 Western (1 by Russian author). [693-7813]

UDC 613.281:636.4.085.57:628.336.1]-07

HYGIENIC EVALUATION OF PORK MEAT FROM ANIMALS FED ON FEED CONCENTRATE FROM EXCESS ACTIVE SLUDGE

Moscow VOPROSY PITANIYA in Russian No 2, Mar-Apr 84
(manuscript received 26 Apr 83) pp 55-57

KONONKO, L.N., RYMAR'-SHCHERBINA, N.B., BARABANOVA, N.M., POPOVA, L.G., STAKHURSKAYA, L.V. and GULICH, M.P., Scientific Research Institute of Nutritional Hygiene, Kiev

[Abstract] Pork meat from pigs whose diet was supplemented with feed concentrate from active sludge during five months was studied. The sludge had been disinfected with an electron flux and dried; the supplement was prepared on the basis of 0.5-1.0 g/kg body weight. This sludge showed high levels of nutrients, minerals and vitamins. The meat obtained from study animals showed high content of cadmium (kidneys) and lead (liver and muscles). Experimental rats were fed this meat for one year. After six months of such diet they began to exhibit elevated levels of peripheral blood reticulocytes and increased activity of aspartate- and alanineaminotransferase. Morphological study of the organs of experimental rats showed no significant changes from the control group animals. Overall, it was concluded that this active sludge should not be used as a food supplement on a large scale. References 9: 7 Russian, 2 Western.

[693-7813]

GENETICS

UDC 575.24:576.851.48

DELETIONS OF pRP3.1ts12 PLASMID, DERIVED FROM PR1, LEADING TO SUPPRESSION OF TEMPERATURE SENSITIVE ts12 MUTATION AND MUCOID PHENOTYPE INDUCTION IN ESCHERICHIA COLI K-12

Moscow GENETIKA in Russian Vol 20, No 3, Mar 84
(manuscript received 13 May 83) pp 373-381

DANILEVICH, V.N., AMOSENKO, F.A., SHTANNIKOV, A.V. and KOSTYUCHENKO, D.A., All-Union Scientific Research Institute of Applied Microbiology, Moscow Oblast

[Abstract] Properties of a temperature-sensitive (in respect to replication) plasmid pRP3.1ts12, which is a shortened variant to the mutant PR1ts12 with a deletion in the region from 2.3 to 7.6 MD are studied and discussed. The possibility of producing pRP3.1ts13 by homologous recombination between PR1ts12 and pRP3.1 shows that mutations ts12 and ts1 of the two plasmids are situated in different genes. Study of temperature-dependent derivatives of pRP3.1ts12 showed that approximately 15% of these induced mucoid growth of the host cells. Most of the latter derivatives contain deletions of small DNA segments; the deletions were mapped in the 0.56-2.3 MD of the RP1 map with the aid of restriction analysis. The possible nature of the gene or genes whose deletions suppress the temperature-sensitive ts12 mutation and cause superproduction of *E. coli* capsular polysaccharide is discussed. Figure 3; references 15: 7 Russian, 8 Western.

[1508-2791]

UDC 575.1.113:576.858.9

FEATURES OF EXPRESSION OF Ap AND Tc GENES OF PLASMID ORIGIN IN LAMBDA VECTORS

Moscow GENETIKA in Russian Vol 20, No 3, Mar 84
(manuscript received 13 Sep 82; final draft received 22 Jul 83) pp 382-387

CHERNYKH, S.I., STEL'MASHENKO, L.N. and KORDYUM, V.A., Institute of Molecular Biology and Genetics, UkrSSR Academy of Sciences, Kiev

[Abstract] Results of study of expression of Ap and Tc genes under effect of various promoters in lambda vectors are discussed. The different orientation of Ap gene relative to a strong promoter (lac-promoter and P_L promoter) made it possible to provide a favorable arrangement of Ap gene for its optimum

expression. Interfering interaction of two closely situated strong promoters, Ap gene and lac promoter and greatly inhibited expression of Ap gene is observed. Amplified expression of Ap gene was seen under the effect of the removed P_L phage promoter. Active expression of Tc gene occurred only in clones with the recombinant lambda-pcv-20 molecule (without lac promoter) regardless of the plasmid pcv-20 orientation. This, possibly, is due to the efficient secondary structure of m-RNA of the Tc gene, which ensures effective translation. Figures 2; references 6: 3 Russian, 3 Western.
[1508-2791]

UDC 575.133.575.153

DIVERGENCE OF STRUCTURE OF MITOCHONDRIA AND CHLOROPLASTS OF AEGILOPS AND TRITICUM. REPORT 2. CHARACTERISTICS OF 22 CYTOPLASMS BY MITOCHONDRIAL STRUCTURE

Moscow GENETIKA in Russian Vol 20, No 3, Mar 84
(manuscript received 8 Oct 82, final draft received 7 Apr 83) pp 440-447

DAVYDENKO, O.G. and PALILOVA, A.N., Institute of Genetics and Cytology, BSSR Academy of Sciences, Minsk

[Abstract] Comparative morphometric analysis of the ultrastructure of mitochondria of 10 alloplasmic wheats and one euplasmic wheat with the Chinese Spring variety genome is described and discussed. There is inconsistent change of various characters in mitochondrial structure in the alloplasmic varieties. The greatest effect of cytoplasm is seen in characters denoting the degree of development of the system of internal membrane, their form and size. Reliable high correlation between some characters of the structure of organelles and some phenotypical features of the alloplasmic plants are found. Classification of 22 cytoplasms according to mitochondrial structure is presented and discussed. Figures 3; references 10: 5 Russian, 5 Western.
[1508-2791]

UDC 575.133:575.153

DIVERGENCE OF STRUCTURE OF MITOCHONDRIA AND CHLOROPLASTS IN AEGILOPS AND TRITICUM. REPORT 3. MORPHOMETRIC ANALYSIS OF CHLOROPLAST ULTRASTRUCTURE

Moscow GENETIKA in Russian Vol 20, No 3, Mar 84
(manuscript received 17 Feb 83, final draft received 25 Apr 83) pp 448-456

DAVYDENKO, O.B., PALILOVA, A.N. and SHCHETININA, M.I., Institute of Genetics and Cytology, BSSR Academy of Sciences, Minsk

[Abstract] Variability of structure of chloroplasts in 22 alloplasmic lines of wheat was studied by comparative morphometric analysis. It was found that different cytoplasms have different effect on structure of chloroplasts, against one and the same genetic background. It is assumed that diversity of

change of traits showing the ultrastructure of chloroplasts indicates that alloplasmic lines differ among themselves in the set of plasmagenes responsible for the chloroplasts' structure. Data presented in the study indicate the wide range of variability in plasmagenes, caused by structure of the chloroplasts. Figures 2; references 8: 5 Russian, 3 Western.
[1508-2791]

UDC 575.15:577.113.5

NOVEL IS-ELEMENT HALOBACTERIUM HALOBIUM LOCALIZED IN BACTERIOOPSIN GENE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 4, Apr 84
(manuscript received 1 Dec 83) pp 560-563

OVCHINNIKOV, Yu.A., ZOZULYA, S.A., ZAYTSEVA, Ye.M., GUR'YEV, S.O., SVERDLOV, Ye.D., KRUPENKO,* M.A. and ALEKSANDROV,** A.A., Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow; Institute of Molecular Genetics,** USSR Academy of Sciences, Moscow

[Abstract] *E. coli* genes were cloned from *H. halobium* S1 and RlmR strains containing inserts of 1.7 and 0.5 kbp respectively in the coding sequence. Nucleotide sequence determination was reported for terminal fragments of these inserts possessing characteristic properties of bacterial IS elements. The primary structures of flanking regions of these inserts were determined by Maxam-Gilbert method showing that the IS element of the RlmR strain was identical to ISH 2. The IS insert from the S1 strain showed no analogy and appeared to be a fourth IS element of *H. halobium*. Figures 3; references 8: 1 Russian, 7 Western.
[1522-7813]

ONCOGENES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 84 pp 72-80

GEORGIYEV, G.P., corresponding member, USSR Academy of Sciences

[Abstract] This is a lecture-type article. Oncogenes constitute one of the most important and challenging areas of oncologic research at the present time, and in the USSR most studies on oncogenes are carried out at the Oncologic Center of the USSR Academy of Medical Sciences and at the Institute of Molecular Biology of the USSR Academy of Sciences. Through cooperation between both institutions, a bank of oncogenes has been created and a number have already been cloned. Other areas of intense activity include studies on

oncogene expression in various human tumor cells, oncogene amplification, and the cytological and immunological aspects of carcinogenesis. Additional studies are concerned with the relationship between transposable elements and oncogene activation. Studies on this and related problems in oncology are conducted under the auspices of the Onkogen program, which is administered by the Interdepartmental Council on Physicochemical Biology and Biotechnology. [725-12172]

LASER THERAPY

UDC 617-001.4-003.9-02:615.849.19]-07:
616-008.944.52:577.175.52

EFFECTS OF INFRARED LASER RADIATION ON TISSUE CATECHOLAMINE LEVELS IN COURSE OF WOUND-HEALING PROCESS

Moscow VOPROSY MEDITSINSKOY KHMII in Russian No 2, Feb 84
(manuscript received 12 May 83) pp 53-56

[Article by PRONCHENKOVA, G.F., CHESNOKOVA, N.P., KOSHELEV, V.N. and ASTAF'YEVA, O.G., Central Scientific Research Laboratory, Saratov Medical Institute]

[Text] There are indications in the literature of activation of regenerative processes and acceleration of repair of unhealing wounds and trophic ulcers of diverse genesis under the influence of low-energy infrared laser radiation at a wavelength of 10.6 μm [1].

It should, however, be noted that no studies have been made to date of the distinctions of metabolic effects of infrared laser radiation on various organs and tissues and, accordingly, there has been no systematization of conceptions of the mechanisms of its effect on development of regenerative processes. In particular, there is no information about the effect of infrared laser radiation on metabolism of such biologically active compounds as epinephrine and norepinephrine. As we know, biologically active compounds provide, with the involvement of adenyl and guanyl cyclase systems, for regulation of various intracellular metabolic processes [2-4].

In view of the foregoing, our objective was to investigate the effect of infrared laser radiation on epinephrine and norepinephrine levels in the area of a healing process, as well as beyond its limits.

Methods

The tests were performed on male rats weighing 200-250 g. A wound process was produced by the conventional method of excising a full-layer skin flap and injuring underlying fascia and the muscle layer [5]. The injury was 20 mm in diameter. The wound surface was exposed to radiation many times in order to test the effect of infrared laser radiation on posttraumatic regeneration processes. We used an LG23 laser. Wavelength was 10.6 μm and energy density 4 mW/cm², single exposure lasting 30 s. The animals were decapitated on the 4th, 8th and 15th day after producing trauma, which corresponded to 3, 7 and 14 laser treatments. Comparative series of experiments were performed at the same stages of the repair process on animals that were not exposed to lasers.

In the course of the healing process we measured catecholamine content of the wound, as well as whole blood, adrenals and hypothalamus. Concentration of catecholamines in blood and tissues was determined by conventional fluorimetric techniques [6, 7].

Results and Discussion

The results of these studies revealed that there was increase in epinephrine content directly in the area of the wound process, as well as blood, adrenals and hypothalamus of the animals on the 4th day of the wound process (Tables 1-4). By the 8th day of the repair process, against a background of a rather high epinephrine and norepinephrine level in the wound, blood and hypothalamus, there was normalization of catecholamine concentration in the adrenals (see Tables 1-4). By the 15th day of the posttraumatic period, we observed complete normalization of catecholamine levels in the adrenals and hypothalamus (see Tables 3-4). Epinephrine level in blood did not differ from the base value, whereas norepinephrine remained high (see Table 2). At the same stages, the levels of biogenic amines were still above base values in the area of post-traumatic regeneration (see Table 1).

Table 1. Effect of infrared laser radiation on catecholamine content ($\mu\text{g/g}$ tissue) of wound during healing

Series of experiments	Time of examination, day					
	4		8		15	
n	$M \pm m$	n	$M \pm m$	n	$M \pm m$	
Epinephrine						
Control group	10	0.041 ± 0.006				
Repair process without laser	10	0.13 ± 0.007 $P < 0.001$	10	0.15 ± 0.02 $P < 0.001$ $P_1 > 0.5$	10	0.07 ± 0.01 $P < 0.002$ $P_1 < 0.001$
Same with laser	10	0.17 ± 0.004 $P < 0.001$ $P_1 < 0.001$	10	0.15 ± 0.01 $P < 0.001$ $P_1 > 0.5$ $P_2 > 0.05$	10	0.04 ± 0.005 $P > 0.1$ $P_1 < 0.002$ $P_2 < 0.001$
Norepinephrine						
Control group	10	0.19 ± 0.05				
Repair process without laser	10	0.58 ± 0.02 $P < 0.001$	12	0.56 ± 0.03 $P < 0.001$ $P_2 > 0.5$	10	0.40 ± 0.01 $P < 0.001$ $P_1 < 0.001$
Same with laser	10	0.82 ± 0.04 $P < 0.001$ $P_1 < 0.001$	11	0.73 ± 0.07 $P < 0.001$ $P_1 < 0.02$ $P_2 > 0.1$	12	0.41 ± 0.03 $P < 0.001$ $P_1 > 0.5$ $P_2 < 0.001$

Note: Here and in Tables 2-4, P is given in relation to control group of animals, P_1 in relation to group of operated nonirradiated animals and P_2 in relation to preceding measurement in same series of experiments.

The typical distinction of laser therapy effect on catecholamine content is that there was more marked increase in epinephrine and norepinephrine content

of different organs and tissues (wound, blood, hypothalamus, adrenals) than in the nonirradiated group of animals, already after 3 laser treatments, i.e., 4th day of the repair process (see Tables 1-4). With longer exposure to infrared lasers (7 treatments), epinephrine and norepinephrine levels in the wound and blood of operated animals remained high (see Tables 1-2). At the same stage of the healing process, epinephrine level in the adrenals had reverted to normal, against the background of a still rather high norepinephrine content (see Tables 3-4). Norepinephrine content of the hypothalamus at these times was significantly higher than in nonirradiated operated animals (see Table 4), whereas epinephrine content did not differ from that demonstrated in operated, nonirradiated animals (see Table 3).

Table 2. Effect of infrared laser radiation on epinephrine and norepinephrine content ($\mu\text{g}/\text{l}$) in animals' blood during wound healing

Animals	Time of examination, day					
	4		8		15	
	n	M \pm m	n	M \pm m	n	M \pm m
Control:						
epinephrine	10	0.32 \pm 0.005				
norepinephrine	11	0.61 \pm 0.05				
Operated, nonirradiated:						
epinephrine	10	0.41 \pm 0.006 $P < 0.001$	17	0.39 \pm 0.03 $P < 0.02$	10	0.38 \pm 0.03 $P > 0.05$
norepinephrine	10	0.73 \pm 0.01 $P < 0.02$	18	0.85 \pm 0.1 $P < 0.02$	11	0.82 \pm 0.06 $P < 0.01$
Operated, irradiated:						
epinephrine	18	0.66 \pm 0.08 $P < 0.001$ $P_1 < 0.02$	21	0.58 \pm 0.006 $P < 0.001$ $P_1 < 0.002$	10	0.41 \pm 0.07 $P > 0.1$ $P_1 > 0.5$
norepinephrine	20	1.06 \pm 0.2 $P < 0.05$ $P_1 > 0.1$	21	1.34 \pm 0.19 $P < 0.002$ $P_1 < 0.02$	10	0.93 \pm 0.1 $P < 0.002$ $P_1 > 0.25$

A comparison of catecholamine concentration in irradiated and nonirradiated animals at these times revealed that, after 7 sessions of laser therapy, there was prevalence of norepinephrine level, as indicated by higher content in the wound, blood, hypothalamus and adrenals.

With regard to the high concentration of catecholamines, which we demonstrated at the above times in the case of laser irradiation in different organs and tissues and, in particular, in the wound, we should mention the possibility of their stimulating effect on activity of mitochondrial dehydrogenases [8]. The latter apparently is what causes the appreciable increase in oxygen uptake in the area of the repair process, which had been noted [9] under analogous conditions of simulating a wound process with delivery of infrared laser radiation.

After 14 sessions of laser therapy, there was complete normalization of epinephrine content of the wound, blood and adrenals with a still elevated norepinephrine level (see Tables 1-4). At this observation period, catecholamine content of the hypothalamus was entirely normal (see Tables 3-4). Thus, the modulating

effect of infrared laser radiation on levels of epinephrine and norepinephrine should be considered the inherent distinction of its biological effect, which was manifested by more drastic elevation of their levels in the wound after 3 and 7 sessions of laser therapy.

Table 3. Effect of infrared laser radiation on epinephrine content ($\mu\text{g/g}$ tissue) of hypothalamus and adrenals during healing process

Animals	Time of examination, day					
	4		8		15	
	n	M \pm m	n	M \pm m	n	M \pm m
Control:						
hypothalamus	10	0.61 \pm 0.007				
adrenals	10	372 \pm 26				
Operated, nonirradiated:						
hypothalamus	11	0.68 \pm 0.01 $P < 0.001$	10	0.69 \pm 0.02 $P < 0.001$	10	0.61 \pm 0.005 $P > 0.5$
adrenals	10	498 \pm 24 $P < 0.002$	10	387 \pm 5 $P > 0.5$	10	374 \pm 7 $P > 0.5$
Operated and irradiated:						
hypothalamus	11	0.75 \pm 0.02 $P < 0.001$ $P_1 < 0.002$	10	0.68 \pm 0.015 $P < 0.002$ $P_1 > 0.5$	10	0.62 \pm 0.01 $P > 0.25$
adrenals	10	654 \pm 29 $P < 0.001$ $P_1 < 0.001$	10	397 \pm 14 $P > 0.25$ $P_1 > 0.5$ $P_2 < 0.001$	10	378 \pm 3 $P > 0.5$ $P_1 > 0.5$ $P_2 > 0.1$

Table 4. Effect of infrared laser radiation on norepinephrine content ($\mu\text{g/g}$ tissue) of hypothalamus and adrenals during healing process

Animals	Time of examination, day					
	4		8		15	
	n	M \pm m	n	M \pm m	n	M \pm m
Control:						
hypothalamus	10	1.10 \pm 0.04	—	—	—	—
adrenals	10	297 \pm 17	—	—	—	—
Operated, nonirradiated						
hypothalamus	11	1.54 \pm 0.06 $P < 0.001$	10	1.32 \pm 0.05 $P < 0.001$ $P_1 < 0.01$	10	1.14 \pm 0.03 $P > 0.5$ $P_2 < 0.002$
adrenals	10	388 \pm 15 $P < 0.001$	10	337 \pm 8 $P > 0.05$ $P_1 < 0.02$	10	325 \pm 3 $P > 0.1$ $P_2 > 0.1$
Operated and irradiated:						
hypothalamus	11	1.80 \pm 0.06 $P < 0.001$ $P_1 < 0.01$	10	1.50 \pm 0.05 $P < 0.001$ $P_1 < 0.01$ $P_2 < 0.001$	10	1.12 \pm 0.02 $P > 0.5$ $P_1 > 0.25$ $P_2 < 0.001$
adrenals	10	440 \pm 14 $P < 0.001$ $P_1 < 0.02$	10	385 \pm 11 $P < 0.001$ $P_1 < 0.002$ $P_2 < 0.002$	10	354 \pm 4 $P < 0.002$ $P_1 < 0.001$ $P_2 < 0.01$

It should be noted that the effect of lasers is not limited to local metabolic changes, but also change in levels of catecholamines in organs and tissues that differ in their functional significance--adrenals, which are the principal site of their deposition and synthesis, hypothalamic structures which include, in particular, the highest autonomic centers for regulation of the adreno-sympathetic system, and blood.

With reference to the changes we demonstrated in catecholamine levels under the influence of laser radiation in and beyond the zone of regeneration, we should refer to data in the literature indicating that biologically active compounds, which regulate activity of adenyl cyclase systems and control processes of glycolysis, lipolysis, permeability of biological membranes, bio-synthesis of nucleic acids and cell division, thereby influence, to some extent, the intensity of repair processes [10]. The latter enables us to expound the hypothesis that the modifying influence on catecholamine metabolism of low-intensity infrared laser radiation is one of the possible mechanisms of its effect on reparative regeneration processes.

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UDC 617.736-007.17-085.849.19

TRANSUDATIVE MACULODYSTROPHY: CLASSIFICATION AND LASER THERAPY

Moscow VESTNIK OFTAL'MOLOGII in Russian No 2, Mar-Apr 84
(manuscript received 30 Mar 83) pp 26-30

BALASHEVICH, L.I., BALUTINA, A.P., VOLKOV, V.V., PREOBRAZHENSKIY, V.G., Leningrad

[Abstract] An assessment was made of laser therapy of transudative maculodystrophy in 79 patients (85 eyes), ranging in age from less than 30 to over 60 years, in order to correlate outcome with disease classification. The patients were treated according to standard protocols either with argon, ruby, or "gas" laser. On the basis of the outcome and in combination with morphologic changes the transudative maculodystrophies can be divided into two broad categories: Group I--disease resulting from circulatory disturbances in the choriocapillary layer, and Group II--pathology due to circulatory disturbance in the retinal capillary meshwork. Group I pathology encompasses central serous retinopathy and exudative senile maculodystrophy (with retinal and pigment epithelium detachment), while Group II encompasses cases with edema of the internal retinal layers, edema + hemorrhagic complications, or edema with cystic changes in the retina. Laser therapy was found most effective in cases with central serous retinopathy with defects in Bruch's membrane, yielding a virtually 100% cure rate in one to three weeks. Laser coagulation can lead to stabilization in the other forms of transudative maculodystrophy without marked improvements in visual acuity; however, in cases complicated by extensive alterations in retinal circulation, use of lasers, particularly argon laser, appears to be of dubious benefit. Figures 5; references 9: 4 Russian, 5 Western.

[717-12172]

UDC 617.735-07:615.849.1(048.8)

LASER RETINOMETRY

Moscow VESTNIK OFTAL'MOLOGII in Russian No 2, Mar-Apr 84
(manuscript received 5 Mar 83) pp 60-63

AVETISOV, V.E., candidate of medical sciences, and BEGISHVILI, D.G., Moscow Scientific Research Institute of Eye Diseases imeni Helmholtz

[Abstract] A cursory review is provided of the history of retinometry, the development of laser retinometry, and current advances and status of the latter

technique. The more recently developed instruments have provided a convenient method for assessing visual acuity in various ophthalmic conditions and the efficiency of the visual sensory apparatus in information processing. Further clinical applications of laser retinometry will undoubtedly come from better appreciation of the fine details of visual information transmission that this technique can provide.

[717-12172]

UDC 616.02:616.517:616.52

LASER TREATMENT OF CHRONIC SKIN DISEASES

Alma Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 5, May 84 pp 59-62

MAKASHEVA, R.K., KOSHAKOV, G.V., GURINA, I.G., ZHUMATOVA, G.G., YESENGARAYEVA, Z.B. and MALDYBAYEVA, N.M., Department of Dermatology (Head of the Department, R.K. Makasheva) Alma-Ata Medical Institute

[Abstract] Use of an LG-75-1 type helium-neon laser and ointment made from synthetic nutrient medium 199 containing 20 essential amino acids, 17 vitamins, nucleic acids and 9 mineral salts to treat 42 persons with slowly healing ulcers of the lower extremities is described and discussed. Clinical recovery occurred in 32 cases and significant reduction in size of ulcers occurred in 10 cases. Remote results showed good therapeutic effect in 28 of 42 patients with no relapses for a length of 3 years. Healing of the ulcers does not mean complete recovery of patients since an unfavorable trophic background remains requiring a strict regimen on the part of patients in order to prevent new ulceration. References 5 (Russian).

[686-2791]

UDC 617-001.4-003.9-02:615.849.19]-07:616-008.944.52:577.175.52

EFFECTS OF INFRARED LASER IRRADIATION ON TISSUE CATECHOLAMINE LEVELS IN EARLY WOUND HEALING

Moscow VOPROSY MEDITINSKII KHIMII in Russian Vol 30, No 2, Mar-Apr 84 (manuscript received 12 May 83) pp 53-56

PRONCHENKOVA, G.F., CHESNOKOVA, N.P., KOSHELEV, V.N. and ASTAF'YEVA, O.G., Central Scientific Research Laboratory, Saratov Medical Institute

[Abstract] In view of the proven therapeutic effects of infrared lasers in wound healing, studies were conducted on the metabolic effects of infrared laser irradiation ($10.6 \mu\text{m}$, 4 mW/cm^2 , 30 sec exposure) on early wound tissue and systemic consequences. Investigations on rats with full-thickness skin wounds demonstrated that irradiation of the lesion resulted in elevation of tissue catecholamine levels in the early granulation tissue and peritraumatic

tissue. Highest levels of epinephrine and norepinephrine were detected on days 4 and 8 (corresponding to 3 and 7 exposures); similar elevations were also noted in blood levels of catecholamines and in the hypothalamus and the adrenal glands. The levels of catecholamines generally returned to normal levels after 15 days (14 treatments). It appears, therefore, that one of the mechanisms by which low-intensity infrared lasers enhance wound healing involves modulation of catecholamine metabolism. References 10 (Russian). [1514-12172]

UDC 617.735-002:616.379-008.64-073.7

ELECTRORETINOGRAPHY IN DIABETIC RETINOPATHY BEFORE AND AFTER LASER COAGULATION

Odessa OFTAL'MOLOGICHESKIY ZHURNAL in Russian No 2, 1984
(manuscript received 15 Nov 83) pp 79-81

PONOMARCHUK, V.S., candidate of medical sciences, SALDAN, I.R., senior scientist, and RESHETNYAK, V.B., physician, Odessa Scientific Research Institute of Eye Diseases and Tissue Therapy imeni Academician V.P. Filatov

[Abstract] Electroretinography (ERG) was employed in assessing the status of 12 patients (24 eyes) in the early stages of diabetic retinopathy and 23 patients (41 eyes) with advanced retinopathy before and after laser coagulation. Laser coagulation was carried out with a Soviet OK-2 laser apparatus emitting monochromatic red light (694.3 nm) at therapeutic intensities. Evaluation of the ERG patterns before and after laser treatment showed increases in the microvoltage amplitudes of the a and b waves, which were particularly impressive 7-10 days after laser therapy. The improvements evident on the ERG were ascribed to improved blood circulation and the attendant increase in the oxygen supply to the retina. ERG can, therefore, be recommended as a monitoring modality for the status of the retina in diabetic retinopathy. References 13: 3 Russian, 10 Western.

[714-12172]

UDC 617.7-001.681-092.9-085.849.19

EXPERIMENTAL EVALUATION OF LASER EFFECTS ON INTRAOCULAR PRESSURE AND OPHTHALMIC HYDRODYNAMICS

Odessa OFTAL'MOLOGICHESKIY ZHURNAL in Russian No 2, 1984
(manuscript received 15 Jul 83) pp 104-107

KOLOMIYETS, A.I., junior scientist, and LINNIK, L.A., professor, Odessa Scientific Research Institute of Eye Diseases and Tissue Therapy imeni Academician V.P. Filatov

[Abstract] Experimental studies were conducted on the effects of various lasers (carbon dioxide, ruby, argon, neodymium) on the intraocular pressure of normotonic rabbits and animals with epinephrine-induced glaucoma.

Assessment of the actual changes, i.e., reduction in eye pressure and the duration of such effects, demonstrated the effectiveness of the ruby laser (690 nm) when used in therapeutic intensities (200-300 mW, 0.2 J) and applied 1-1.5 mm from the limbus at the drainage site. In rabbits with chronic glaucoma of 2 years duration and ocular pressure of 20-28 mm Hg, the intraocular pressure fell to 15-18 mmHg and remained within the normal level for 2 years. Carbon dioxide laser is contraindicated in view of thermal damage to the eye. The safety of the ruby laser in the intensities employed was also confirmed by histological studies, and the experience suggests that it should be considered for clinical application. Figures 2; references 20: 12 Russian, 8 Western.

[714-12172]

MARINE ANIMALS

UDC 599.51/53:591.483:575.86

COMPARATIVE MORPHOLOGY OF CRANIOCEREBRAL NERVES AND ORIGIN OF CETACEANS

Moscow ZOOLOGICHESKIY ZHURNAL in Russian Vol 58, No 5, May 84
(manuscript received 17 Dec 82) pp 760-766

ACARKOV, G.V. and KHOMENKO, B.G., Institute of Zoology, UkrSSR Academy of Sciences, Kiev; Kiev Pedagogic Institute

[Abstract] To this time none of the hypotheses on the origin of cetaceans have been sufficiently substantiated. Morphology of craniocerebral nerves was studied in detail because of the evolutionary changes which occurred in this group of mammals. The observed differences in the morphology of the trigeminal and facial nerves of odontoceti and mystacoceti cetaceans are related to different paths of the formation of their skull during adaptation to an aquatic life style. Analysis of the data obtained support the convergence theory of the development of cetaceans. A close relationship is shown between the morphology of craniocerebral nerves and the changes in visceral portion of the head and skull during evolutionary development of two suborders: Odontoceti and Mystacoceti, supporting the convergent rather than the divergent route of evolution. Adaptation to the aquatic life style was achieved by different paths. Figure 1; references 29: 16 Russian (1 by Western authors), 13 Western (1 by Russian author).

[697-7813]

MEDICINE

IMPLEMENTATION OF JUNE 1983 PLENUM OF CPSU CC

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 30, No 2, Mar-Apr 84
pp 2-4

[Abstract] The decisions of the June 1983 Plenum of the CPSU CC are discussed in light of the impact they have on the medical profession in general, and on medicinal chemistry in particular. Recent advances in the formulation of new diagnostic and therapeutic agents and reagents are covered, as well as the contributions made to fundamental biology and genetic engineering. "However, despite significant progress in medicinal chemistry, further progress has been retarded by the limited variety and insufficient quantities of chemical reagents and biochemical preparations, especially enzymes, and instruments and supplies that form the cornerstone of such research." With the increasing emphasis on mass screening (universal health checkups, dispensarization) in the USSR, laboratory tests have acquired new urgency. "In the screening process tests involving enzymes and isoenzymes are of prime importance. The major task is to improve such techniques and to develop rapid methods of enzyme diagnosis. It is high time to establish Soviet production of ready-to-use reagents for clinical enzymology. No less important is the development, production and delivery of Soviet automated systems for the determination of enzymatic activities."

[1514-12172]

UDC 616.61-002.151-07:616.153.445+616.633.455+616-008.931:577.152.1]-074

ALTERED CARBOHYDRATE METABOLISM IN PATIENTS WITH HEMORRHAGIC FEVER COMPLICATED BY NEPHROTIC SYNDROME

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 30, No 2, Mar-Apr 84
(manuscript received 19 Sep 82) pp 34-37

ANISIMOVA, N.I., KONSTANTINOV, A.A. and KOVAL'SKIY, G.S., Chair of Biochemistry and Infectious Diseases Clinic, Khabarovsk Medical Institute

[Abstract] The status of carbohydrate metabolism was studied in 80 male and female patients, 15-62 years old, with epidemic hemorrhagic fever complicated by the nephrotic syndrome. The results of clinical chemistries showed that in all patients there was a severity-related elevation of serum levels of lactate,

pyruvate, glucose, LDH and glucose-6-phosphatase. These findings were interpreted to indicate activation of glycolysis due to depression of aerobic oxidation resulting in metabolic acidosis. With alleviation of the underlying pathology these indicators of carbohydrate metabolism showed normalization. It is evident, then, that determination of serum and urinary levels of lactate and pyruvate can be used to monitor the progress of epidemic hemorrhagic fever in terms of its effects on carbohydrate metabolism. References 17: 15 Russian, 2 Western.

[1514-12172]

MOLECULAR BIOLOGY

UDC 547.963.32.07

ORGANOPHOSPHORUS ANALOGUES OF BIOLOGICALLY ACTIVE SUBSTANCES. REPORT 13.
PHOSPHONATE ANALOGUES OF ACETYL- AND AMINOACYLADENYLATES AS INHIBITORS OF
ENZYMES. SYNTHESIS AND THEIR PROPERTIES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 2, Feb 84
(manuscript received 26 Jul 83) pp 213-219

YAKOVLEVA, G.M., TARUSOVA, N.B., BIRYUKOV, A.I. and KHOMUTOV, R.M.,
Institute of Molecular Biology, USSR Academy of Sciences, Moscow

[Abstract] Phosphonate analogues of 5'-acetyl and 3'-aminoacyladenylates were synthesized and their effects were evaluated on reactions catalyzed by acetyl-CoA- and aminoacyl-tRNA-synthetases which activate carboxylic acids. All analogues were sufficiently stable and their structures were supported by IR-, UV- and NMR spectra. All of these analogues inhibited the PP_i-exchange reactions and acetylation of CoA. Using this series of analogues, it was shown that the specificity towards individual stages of enzymatic reactions of enzymes catalyzing chemically similar reactions may be different.
References 21: 7 Russian, 14 Western (1 by Russian authors).
[1520-7813]

UDC 577.113.6:577.218

SYNTHESIS OF A 33-MEMBER POLYNUCLEOTIDE CONTAINING "core" att SITE DNA OF
BACTERIOPHAGE λ AND ITS CLONING

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 19, No 2, Feb 84
(manuscript received 1 Jun 83, after revision 1 Aug 83) pp 220-225

KRAVCHENKO, V.V., SERPINSKIY, O.I., SINYAKOV, A.N. and POPOV, S.G., All-Union
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Oblast

[Abstract] Current methods of chemical-enzymic syntheses of DNA fragments are based on production of 10-15 member oligonucleotides followed by enzymic linkage by means of DNA-ligase. A new method was developed for production of polynucleotides based on solid-phase phosphotriester method of

assembling the chain from 5' - to the 3'-terminal. Two polynucleotides with 33 monomeric units were obtained forming a duplex with protruding 5'-terminals which made it possible to insert EcoRI site of the cloning vector. Plasmid pUR222 was used as a vector for cloning this synthetic fragment of DNA. This plasmid carried gene "α-peptide" of β-galactosidase, inside which were a number of unique sites for restriction. After purification by electrophoresis, the duplex was cloned in the EcoRI site of pUR222 plasmid DNA. Using the sequencing method of Maxam-Gilbert, the structure of this duplex was confirmed; it contained the fragment "core" att site of DNA Bacteriophage λ. Figures 4; references 14: 5 Russian, 9 Western.
[1520-7813]

UDC 547.963:32.07+5773+535.217

SELECTIVE LASER CLEAVAGE OF POLYADENYLIC ACID USING FLUORESCENT DERIVATIVE OF OLIGOOTHYMIDYLATE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 4, Apr 84
(manuscript received 28 Aug 83, after revision 3 Oct 83) pp 520-527

BULYCHEV, N.V., LEBEDEV, A.V., BENIMETSKAYA, L.Z., KOZIONOV, A.L., NESTERIKHIN, Yu.Ye., NOVOZHILOV, S.Yu., RAUTIAN, S.G. and SHTOKMAN M.I., Novosibirsk Institute of Organic Chemistry, Siberian Department of USSR Academy of Sciences; Institute of Automation and Electrometry, Siberian Department of USSR Academy of Sciences, Novosibirsk

[Abstract] Achievement of a directing chemical action on biopolymers is one of the principal tasks of molecular biology. In this study nonlinear laser cleavage of poly (A) chain was observed using a directed fluorescent oligonucleotide derivative containing a chromophore group. As an example of this synthesis, 2'-deoxyadenosine containing N-(5-dimethylamino-2-naphthalenesulfonyl)-2-aminoethanol (DnsNHET-OH) bound to 5'-phosphomonoester group was obtained. (DnsNHET)₉ (I) formed a stable complex with poly (A). When irradiated with nitrogen laser beam, the poly (A) chain was cleaved. No such cleavage was observed in poly (C) or poly (U) chains in presence of I. The cleavage of poly (A) could be due to radiation energy transfer from I chromophore to the polynucleotide chain. Figures 6; references 15: 8 Russian, 7 Western (2 by Russian authors).

[1522-7813]

CHEMICAL ENZYMIC SYNTHESIS OF OLIGONUCLEOTIDE MATRIX OF 4-10 ADRENOCORTICOPTOPIC HORMONE FRAGMENT ANALOGUE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 4, Apr 84
(manuscript received 6 Dec 83) pp 564-566

RATMANOVA, K.I., BOCHAROVA, T.N. and ANDREYEVA, L.A., Institute of Molecular Genetics, USSR Academy of Sciences, Moscow

[Abstract] The chemical-enzymic synthesis of nucleotide matrix neuropeptide--memory stimulant [Pro⁸, Gly⁹, Pro¹⁰]ACTH-(4-10)-peptide was studied with the goal of expressing it in simple organisms. In the process, 6 oligodesoxy ribonucleotides were synthesized ranging from 9 to 13-mer by the phosphodiester method and joined enzymatically by T4 DNA ligase. A double stranded DNA with 32 base pairs and protruding 5'-terminals acting as the recognition sites for EcoRI and BamHI restrictases was obtained representing an oligonucleotide matrix coding for adrenocorticotropic hormone. Figures 3; references 11: 6 Russian, 5 Western.
[1522-7813]

NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

MAN AND MAGNETIC FIELDS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 May 84 p 4

ZOLOTOVA, L.

[Abstract] Use of magnetic fields in medicine in the USSR is described. Magnetic fields are being used in many Soviet republics in a wide range of diseases and conditions including hypertension, insomnia, stomach conditions, trauma, burns, rheumatoid arthritis, gynecological diseases, etc. Experimental studies have shown their benefit in organ and tissue transplants, hemosorption and lymphosorption. Design and construction of apparatus to facilitate the use of magnetic fields in medicine are described briefly. A brief account of the use of magnetic fields in medicine over the centuries is presented. Experiments involving the use of magnets to localize medicines precisely in the areas being treated are mentioned.

[740-2791]

LATVIAN NEUROSURGEON

Riga SOVETSKAYA LATVIYA in Russian 1 Jul 84 p 4

PRIYEDITE, A.

[Abstract] A sketch is provided of the life and work of the noted Latvian neurosurgeon Raymond Petrovich Kikut, who heads the Neurosurgical Center in Riga. Despite hard beginnings, he has brought neurosurgery to a state of perfection in Latvia, while his research interests have earned the acclaim of leading Soviet scientists. "Academician A. Arutyunov in his time highly valued his (Kikut's) work in magnetobiology. After all, magnetic field therapy meant the real possibility of avoiding the need for an operation. As Arutyunov expressed it: 'Every true surgeon understands that surgery is the discipline of last resort. If it were possible to do without surgery, I would forsake it immediately'. Neurosurgery is a discipline of special desperation. It affects all neurosurgeons in that manner. Kikut is no exception. This sense of desperation always accompanies him. However, now it is possible to treat some diseases with magnetic field therapy. In 1980 R. Kikut and his coworkers received the State Prize of the Latvian SSR for the development and practical implementation of new methods for the treatment of cerebrovascular vessels. Specifically, this award was for magnetotherapy."

[749-12172]

EFFECTS OF CONTINUOUS LOW INTENSITY MILLIMETER WAVE IRRADIATION
ON Na^+ TRANSPORT IN FROG SKIN

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 10 Aug 82; in final form 27 Jan 83) pp 480-482

KAZARINOV, K.D., SHAROV, V.S., PUTVINSKIY, A.V. and BETSKIY, O.V., Institute of Radiotechnology and Electronics, USSR Academy of Sciences, Moscow

[Abstract] Conditions are described under which the effects of millimeter waves (7.2 to 8.5 mm) of low intensity (0.1 to 100 mW/cm^2) on Na^+ transport in frog (*Rana temporaria*) skin were studied. All wavelengths induced an increase in the electrical skin potential, a phenomenon which was consonant with an increase in Na^+ transport. The effects were reversible on termination of irradiation. The effects were obtained only with irradiation of the external cutaneous layers where Na^+ -transporting epithelial cells are located, and incubation with active transport inhibitors depressed the skin potential at least two-fold. The effects of the millimeter waves in enhancing Na^+ transport were due to induction of temperature gradients in water layers adjacent to the skin surface and the resultant convection currents, which facilitated removal of Na^+ (and other substances) from the pericutaneous water layer. Figures 1; references 4: 3 Russian, 1 Western.
[1512-12172]

PHARMACOLOGY AND TOXICOLOGY

UDC 579.841.11:615.919]:579.61:616.1-099-092.9

ACTION MECHANISM OF PSEUDOMONAS AERUGINOSA EXOTOXIN ON MACROORGANISM
(EXPERIMENTAL STUDIES)

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3,
Mar 84 pp 35-39

[Article by S.T. Dzyubak of the Ivano-Frankovsk Medical Institute; received
26 Apr 83]

[Text] Elucidation of the pathogenic action mechanisms of *P. aeruginosa* and its metabolic products on the body is important for successful therapy and prophylaxis of a generalized pyocyanic infection. The data [4] we had received earlier and the research results of other authors [11, 12] indicate that the exotoxin of pyocyanic bacteria has a selective tropism in relation to many vital organs and systems. It has also been established that under conditions of experimental pyocyanic intoxication, induced by intraperitoneal administration of *P. aeruginosa* exotoxin into rats, sufficiently pronounced changes of vessel microcirculation and permeability appear, as well as structural disorders of many organs [5].

We studied the action mechanism of *P. aeruginosa* on the main link of the blood circulatory system--the central hemodynamics as well as the hemocoagulative and chemiluminescent properties of the peripheral blood, which reflect the nature of the metabolic processes during many pathological states.

Materials and Methods. One of the most modern methods for heart efficiency determination, the thermodilution method [8, 9], was used to evaluate the central hemodynamics. The studies were conducted on 12 mongrel female dogs weighing 10-15 kg. The exotoxin, obtained by an earlier described method [5], was administered intraperitoneally in a dose of 0.3 ml (126 mcg of protein) per 1 kg of animal weight. The following hemodynamic indicators were determined and calculated: minute blood volume, stroke volume, general peripheral resistance, cardiac and systolic indices, and left ventricle output. Arterial pressure, heart rate and respiration rate were recorded with the assistance of a sphygmometer, electrocardiograph and kymograph, respectively.

Change of Chemiluminescent Parameters in the Blood Serum of Rats with Pyocyanic Intoxication ($M \pm m$)

Срок после введения токсина, ч (1)	Параметр хемилюминесценции (2)							
	* (3) (6)	h (4) отн. ед.	ам (5) отн. ед.	tg G (7)		S ₄ . отн. ед. (8)	t ₁ (9) мин	t ₂
				tg G (7)	S ₄ . отн. ед. (8)			
3	0,67±0,07	4,9±0,14**	7,48±1,29	1,5±0,29*	9,5±1,04	3,4±0,36	37,2±0,5	
6	0,43±0,03	3,6±0,29	5,8±0,29**	1,2±0,37*	3,8±0,43***	4,3±0,47	34,7±2,56	
12	0,35±0,06	4,3±0,38**	13,4±0,88**	4,9±0,72*	6,2±0,78*	2,6±0,36	35,7±2,18	
24	1,0±0,26	5,9±0,42**	15,3±0,61**	3,2±0,56	11,3±1,42	2,2±0,51	36,5±1,46	
(10) Контроль	0,39±0,10	3,8±0,34	10,4±0,93	2,9±0,49	9,6±1,26	3,2±0,22	38,5±2,46	

Note: Asterisks show indicators, reliably different from the control: one asterisk-- $P<0.05$, two asterisks-- $P<0.02-0.01$, three asterisks-- $P<0.001$.

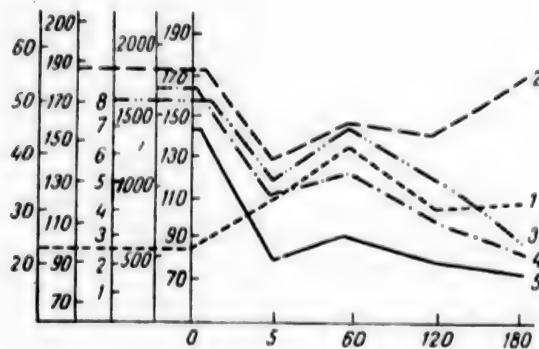
Key:

1. Period after toxin administration, hrs
2. Chemoluminescence parameter
3. Amplitude
4. Amplitude of fast flashing
5. Flashing amplitude
6. Relative units
7. Amplitude of slow flashing
8. Light sum of slow flashing luminescence, relative units
9. Minutes
10. Control

The blood coagulative system was studied on a 4-channel thrombelastograph (Tromb-1). The experiments were conducted on 22 rabbits weighing 2.5-3 kg. The exotoxin was administered intraperitoneally in a dose of 0.1 ml per 1 kg of animal weight.

Blood serum chemiluminescence was studied in 52 rats weighing 200-250 g. The exotoxin was administered intraperitoneally in a dose of 0.5 ml per 1 kg of animal weight. Superlow luminescence was recorded on an apparatus with an FEU photomultiplier. Into the thermostatic flask of the apparatus 9.7 ml of a phosphate buffer with a 7.5 pH was poured and 0.3 ml of blood serum was added. The reaction was activated by introducing 1 ml of a $5 \cdot 10^{-2}$ M solution of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ and recorded for 30 min. The luminescence development curves were analyzed according to the method of Vladimirov and coauthors [3].

The exotoxin dose for the animals was selected on the basis of their specific sensitivity.



Some Central Hemodynamic Indicators with Experimental Pyocyanic Intoxication.

1 - respiration (rate per minute); 2 - heart contraction rate (number of strokes per minute); 3 - heart stroke volume (in ml); 4 - minute volume (in ml/min); 5 - arterial pressure (in mm Hg). Along the abscissa--duration of intoxication (in min).

Results and Discussion. Results of the conducted studies showed that intravenous administration of exotoxin to animals is accompanied by sufficiently pronounced changes of the studied central hemodynamic parameters (see graph). First of all, the earliest intoxication period (5 min after toxin administration) was characterized by obvious lowering of arterial pressure to a level of 78.3 ± 11.2 mm Hg with the norm being 146.0 ± 6.4 mm Hg ($P < 0.001$). During this period the left ventricle output index and cardiac index were reduced by 67.23 and 47.04%, respectively. Typical for the early toxic trauma, also, was reduction of the minute volume to 828.2 ± 72.0 ml/min with the norm being 1628.0 ± 111.8 ml/min ($P < 0.001$), as well as reduction of the general peripheral resistance ($P < 0.01$). Pronounced bradycardia with symptoms of developing dyspnea were observed against a background of progressive lowering of the systemic hemodynamic volume indicators. The systolic pressure rate decreased to 139.2 ± 9.6 per minute with the norm being 187.0 ± 12.9 per minute, and, correspondingly, the respiratory rate increased from 24.4 ± 1.3 to 31.2 ± 1.9 ($P < 0.05$).

Later, during the first hour of intoxication development, intensification of the basic adaptive reactions was observed that was expressed by a rise in arterial pressure of 72.6% from the initial level. Restoration of the stroke volume took place in a wavelike manner up to 84.8% of the initial value, the minute volume increased, the indicators for the cardiac and systolic indices improved, and the number of heart contractions increased. The general peripheral resistance remained lowered.

During the second hour of intoxication the arterial pressure continued to be lower by 46.4% than the initial level. A further reduction of the stroke and minute volumes were recorded, as well as a reduction of left ventricle output. For the first time during the entire intoxication period, a lowering of the systolic index compared to the control was observed. The general peripheral resistance and the heart contraction and respiration rates were markedly restored, although they did not reach the initial indices.

Three hours after exotoxin administration the arterial pressure remained lowered as before; however, its level was higher than the critical level (73.0 ± 13.3 mm Hg). A further lowering of the heart beat and minute volume appeared, the cardiac and systolic indices were lowered by more than half and left ventricle output was reduced by 5.3 times.

Study results of the blood hemocoagulative potential showed that, as early as the first hour of toxemia, the latent period of blood coagulation in rabbits decreased (0.86 ± 0.16 min) compared to the control (2.2 ± 0.29 min, $P < 0.001$). During this period the clot formation time became shorter (2.3 ± 0.45 min with the norm being 4.3 ± 0.66 min, $P < 0.005$), the blood coagulation process became more intense due to the elasticity growth rate of the thrombus, and the maximum amplitude increased from 67.0 ± 2.14 to 80.0 ± 1.96 mm. The marked increase of hypercoagulative properties in the blood under the influence of intoxication development is demonstrated by such indicators as the shortening of the general blood coagulation constant, the general coagulation index as well as the increased index of blood clot elasticity. However, in the course of further studies, many of the mentioned indicators returned to their initial levels and even changed in the direction of hypocoagulation. Thus, 3 hours after exotoxin administration, the time of the latent blood coagulation reaction was 9.3 ± 0.95 min ($P < 0.001$), blood clot formation-- 3.9 ± 0.53 min ($P < 0.5$). The obtained data confirm the clinical observations [7] and indicate that in the first period of pyocyanic intoxication, as a result of disturbed microcirculation and the development of tissue hypoxia, cellular element damage appears with the release of tissue thromboplastin. The rapid using up of fibrinogen with the formation of numerous thrombi leads to a shortage of fibrinogen in the peripheral blood, and to the activation of fibrinolysis and anticoagulants.

The data of the conducted superlow luminescence studies--chemiluminescence of the blood serum of rats with pyocyanic intoxication, as a whole, also corresponded to the nature of pathological process development (see table). During the first 3 hours of intoxication a rate reduction in chemiluminescence, activated by Fe^{2+} ions, was observed in the animal blood serum. The amplitude (am) of luminescence progressively decreased by 27.9% compared to the control, and after 6 hours this indicator reached 44.2% ($P < 0.01$). Even more obvious were the changes of slow flashing ($tg G$), which decreased by 58.7% ($P < 0.05$), compared to the control, during the 6 hours of intoxication. The light sum of slow flashing (S_4) luminescence remained at the control level, and the amplitude of fast flashing (h) after some increase, also, returned to the initial level in 6 hours. The chemiluminescent indicators increased appreciably during the later periods of pathological process development. By the end of the first day the amplitude of fast flashing grew by 55.3% ($P < 0.01$) compared to the control, and correspondingly the amplitude of luminescence increased by 51.9% ($P < 0.01$). Likewise, the rate of slow flashing development was almost doubled. Throughout the experiment the other chemiluminescent parameters changed insignificantly compared to the control.

Thus, the results of the conducted studies on three animal species reveal many aspects of pyocyanic intoxication pathogenesis at the earliest stages of its development.

The formation mechanisms of the pathological changes described above may be extremely varied. As mentioned earlier, in the pyocyanic intoxication process the first serious disorders appearing in the microcirculation system of the parenchymatous organs cause their hypoxia; this leads to tissue acidosis and impairment of the hemoagglutinative properties of the blood. The body responds to this by actuating the emergency adaptation mechanisms, directed toward improvement of the blood supply, and this means tissue trophism as well. The latter is largely determined by the amount of perfusion pressure, which in turn depends on the tonus of peripheral vessels, blood circulation volume, and the pumping function of the heart. A direct damaging action of *P. aeruginosa* exotoxin on the resistive vessels and myocardium, also, cannot be excluded; as a result of this action the peripheral resistance is lowered, the venous return of blood is disturbed and the contracting power of the heart muscle suffers. Under exotoxin influence marked disorders of lipid peroxide oxidation take place in the body. The weakening of activated luminescence in the early stage of intoxication may be explained by the lowered concentration of blood serum lipoproteins as well as, possibly, by the change of their chemical composition due to the disturbed functional activity of the liver [6, 10]. Also, the output into the blood plasma of protein proteolysis products of the low molecular peptides, which inhibit chemiluminescence, cannot be excluded. Weakening of superlow luminescence is undoubtedly related to the decomposition of mast cells and secretion of heparin and components similar to it, which display an inhibiting action on the degree of luminescence [2]. The observed intensification of chemiluminescence in the later periods of intoxication is due to the appearance of luminescence activators, particularly catecholamines, in the blood. It may, also, be assumed that the intensification of chemiluminescence is related to lowered detoxification activity of the liver, which is determined by its structural changes.

Thus, the results of the conducted studies provide a basis for assuming that, under conditions of experimental pyocyanic intoxication, pronounced changes take place in the blood circulation system and the metabolic processes of the organs. This allows us to evaluate the development of the generalized pathological process in the body during which, as a result of the action of the biologically active components of the *P. aeruginosa* exotoxin, serious morphofunctional changes of many vital organs appear, often accompanied by death of the animal.

Conclusions

1. Development of the pathological process with pyocyanic intoxication is accompanied by functional central hemodynamic disorders: lowering of arterial pressure, decrease of minute and systolic volumes of the heart, weakened output of the left ventricle and phase changes of the general peripheral resistance blood flow. Respiration insufficiency appears against a background of organic injuries and metabolic disorders.
2. The coagulative power of the blood increases at the start of intoxication, and decreases 3 hours after exotoxin administration.
3. A definite relationship has been established between change of blood serum chemiluminescence parameters and gravity of pathological process development, indicating metabolic process disorders on the system, organ and tissue levels.

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CSO: 1840/1527

UDC 578.085.23:612.014.462

EFFECT OF BATRACHOTOXIN ON SODIUM CHANNELS OF NEUROBLASTOMA CELL MEMBRANES

Leningrad TSITOLOGIYA in Russian Vol 26, No 4, Apr 84
(manuscript received 8 Apr 83) pp 415-423

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[Abstract] Alkaloid neurotoxins aconitin, batrachotoxin (BCT), veratridin react with sodium channels of excited cell membranes changing their gate function and selectivity. The effect of BCT on neuroblastoma cell cultures was examined. The method of potential fixation was used to measure the current, making it possible to determine kinetic and stationary parameters of normal and modified sodium channels. It was shown that BCT induced a 25-40 mV shift in the voltage range of activation towards the negative potentials along with the appearance of a steady state sodium conductivity. As shown by partial decay of the current during the depolarization and its relationship to prepulse kinetics, the BCT-modified sodium channels retained their ability towards partial inactivation. The channel selectivity was also affected by BCT. The permeability ratios of Na:NH₄:K for BCT-modified and for normal channels were shown to be 1:0.7:0.29 and 1:0.35:0.11 respectively. Figures 6; references 31: 9 Russian, 22 Western (7 by Russian authors).
[684-7813]

UDC 612.13-06:612.821.3

PHARMACOLOGICAL ANALYSIS OF INTERRELATIONSHIP BETWEEN EMOTIONALLY-DETERMINED BEHAVIORAL AND HEMODYNAMIC RESPONSES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 4, Apr 84
(manuscript received 29 Jul 83) pp 22-28

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[Abstract] Extensive research studies on the interrelationship between emotionally-determined behavior patterns and cardiovascular reactions have led to the identification of two neural underlying mechanisms: reflex and central

(i.e., cortical) components. The fine interaction between the cortical and the reflex mechanisms results in modulation of the pressor effects due to central and mechanoreceptor influences by proprioceptive signals. The fine-tuning of such adaptive processes by neuromediators remains largely unresolved. However, some recent observations have indicated that various neurotropic and psychotropic agents exert modifying effects on the coupling of emotional and cardiovascular states. More recently it has been demonstrated that, in the cat, injection of leu-enkephalin into the fourth ventricle potentiates hypertension due to hypothalamic stimulation, while met-enkephalin is devoid of such activity. Both preparations inhibited baroreceptor reflexes. In addition, neuropeptides induced an emotiogenic hemodynamic change similar to that obtained with leu-enkephalin, but its effects on the baroreceptors are diametrically opposed to those of leu-enkephalin. Such findings underline the need to further define the role of the various peptides in the regulation of hemodynamic responses. Figures 3; references 24: 13 Russian, 11 Western.

[742-12172]

UDC 577.354.3:591.145.3-812

MUTUAL DISTRIBUTION OF ACETYLCHOLINE RECEPTOR SUBUNITS AND NEUROTOXIN BOUND TO IT

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 10, No 2, Feb 84
(manuscript received 24 Aug 83) pp 176-187

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[Abstract] Snake neurotoxins are used in studies of acetylcholine receptors. Individually, neurotoxins and receptors have been adequately studied but the structure of their complexes has remained unresolved. Considerable portion of neurotoxin surface appears to be involved in binding with the receptor, but which subunits of the receptor are involved with which portions of neurotoxin remains unclear. To solve some of these questions, a series of neurotoxin II Naja-naja oxiana derivatives were prepared containing p-azido-[¹⁴C] benzoyl group (I). Acetylcholine receptor from the electric organ of *T. marmorata* was isolated by a standard method and it was shown that neurotoxins, labeled at Leu¹, Lys¹⁵, Lys²⁵, Lys²⁶ and Lys⁴⁶, associated with it forming covalent bonds as a result of irradiation. Using electrophoresis in polyacrylamide gel followed by gel chromatography, the contacts of neurotoxins with α , β , γ and δ subunits of the receptor were identified. It was shown that the direction of subunit tagging was dependent on where in the neurotoxin molecule was the photoactivated group I. Analysis of photoinduced crosslinking, when one site was blocked by hexa(trifluoroacetyl)neurotoxin II, showed the differences between the two neurotoxin binding sites. Figures 5; references 30. 3 Russian, 27 Western (6 by Russian authors).

[1520-7813]

UDC 612.822.1: 547.466]-06: 612.766

MOTOR ACTIVITY AND LEVELS OF NEUROACTIVE AMINO ACIDS IN BRAIN TISSUE

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian No 7, Jul 83
(manuscript received 31 Jan 83) pp 51-54

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[Abstract] A study was made of the effect of forced motor activity on quantitative shifts in gamma-aminobutyric acid [GABA], glutamic acid and aspartic acid experimentally in the brains of healthy rats and in experimental impairment of cerebral blood flow, with comparison evaluation from determination of these amino acids in the cerebrospinal fluid in cats. Forced motor activity was by swimming. The acid-base balance of arterial blood was recorded simultaneously in all experiments. After 3 days of swimming (0.5 hours daily with a load of 5% body weight) GABA levels had risen 80% in the cortex (from 10.1 ± 0.8 to 18.2 ± 0.4 mg%, $P < 0.05$), while the level of aspartic acid remained unchanged. Similar shifts were observed in the hypothalamus. In parallel studies of the acid-base balance in arterial blood no changes were observed in these indexes. In impaired cerebral blood supply, GABA levels rose 26.5% one hour after arterial ligation, while the aspartic acid level remained unchanged. This, combined with the drop in the level of glutamic acid, suggests a restorative mechanism to supply blood to the deprived part of the brain. Further motor activity in impaired subjects resulted in more marked changes in the amino acid levels in brain tissue. The experiments to determine amino acid levels in the cerebrospinal fluid in cats showed increased levels of glutamic acid, glycine and aspartic acid; arterial ligation resulted in a drop in the level of glutamic acid and a rise in aspartic acid and glycine levels. It is concluded that, in impairment of intracranial blood flow, the neuroactive amino acids promote support of homeostasis. Figures 1; references 14: 9 Russian, 5 Western.

[569-9642]

UDC 612.826.1 "52" + 612.826.1.014.46: 615.214

DIURNAL VARIATION IN ACTIVITY OF CAUDATE NUCLEUS AND SENSITIVITY TO PSYCHOTROPIC SUBSTANCES IN CATS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian No 7, Jul 83 (manuscript received 17 Dec 82) pp 69-72

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[Abstract] A study was made of diurnal variation in the activity of the caudate nucleus in cats and the significance of this factor in the pharmacologic effect of the psychotropic drugs phenamine and haloperidol.

In accordance with generally accepted ideas that the cat is a nocturnal animal, the greatest activity in experimental subjects was observed between midnight and 0300 hours; functional activity was lowest at 0900-1500 hours. In low doses (0.5 mg/kg) phenamine slightly raised spontaneous activity, including locomotor activity. The phenamine stereotype was most easily evoked between midnight and 0200 hours using doses of 1 mg/kg. Haloperidol (0.25-0.5 mg/kg) suppressed spontaneous activity more strongly during the daytime than at night. Both phenamine and haloperidol altered the indexes of the caudate nucleus as a direct function of diurnal variation. The findings indicate diurnal variation in the activity of the caudate nucleus and a marked influence on the pharmacologic action of the psychotropic agents studied. The weakening of the restraining function of the caudate nucleus during nighttime hours could be explained by the general rise in the level of activity in the animals resulting from limitation of the activity of the inactivating system in the brain, of which the caudate nucleus is a part. The reason for the caudate deficit could be explained by accumulation of nigrostriatal dopamine during the hours of darkness. Figures 3; references 14: 8 Russian, 6 Western.

[569-9642]

EFFECTS OF CERTAIN PHARMACOLOGIC AGENTS ON NEUROMEDIATOR RELEASE

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84 (manuscript received 16 Dec 83) pp 504-505

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[Abstract] Several pharmacologic agents were evaluated for their effects on neuromediator release in terms of effects on miniature end-plate potentials (MEPP), using a grass-frog cutaneous chest muscle preparation. Decylamine, in combination with eserine and picric acid, increases the frequency and amplitude of MEPP in solution with normal ionic composition and calcium-free solutions, without affecting the resting potential (RP). Decamethonium at concentrations of $(2-6) \times 10^{-7}$ M increases the frequency of MEPP without affecting amplitude, while concentrations of 10^{-5} M to 2×10^{-4} M abolish MEPP and significantly depress the RP. After washing, MEPP reappears and apparently the decamethonium reacts with receptors by excluding ions. Gossypol depresses the amplitude of MEPP, while slightly increasing its frequency, presumably due to direct action on the postsynaptic membrane. Viadril G favors influx of Ca^{++} into the protoplasm of the nerve termini and blocks a portion of the receptors from interacting with neuromediators. In addition, Be^{++} ions block the release of acetylcholine. (The article has been deposited in full with VINITI, No 1147-84, 29 Feb 84).

[1512-12172]

PHYSIOLOGY

UDC 616.153.1:577:152.313]-02:613.166.9-092.9

EFFECTS OF HYPEROXIA, HYPOXIA AND COLD ON SERUM GLUCOSE-6-PHOSPHATE DEHYDROGENASE

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 30, No 1, Jan-Feb 84
(manuscript received 3 Jan 83) pp 60-63

GOROSHINSKAYA, I.A., ANANYAN, A.A., BRONOVITSKAYA, Z.G. and SHUGALEY, V.S., Scientific Research Institute of Biology, Chair of Biochemistry, Rostov-on-Don University imeni M.A. Suslov

[Abstract] The membrane effects of such stress factors as hyperoxia, hypoxia and cold were studied by determining their effects on serum levels of glucose-6-phosphate dehydrogenase in the rat, since this enzyme represents a typical erythrocyte membrane molecule. Comparative evaluation of the effects of these three stress factors revealed that all factors induced elevation of the dehydrogenase activity in proportion to the degree of stress with, in the case of 60 day cold exposure, moderate reduction in activity with adaptation. Indications that the changes in enzyme activity were due to erythrocyte damage were also provided by elevation of serum iron levels and extracellular hemoglobin. Elevated dehydrogenase activity in cold-adapted rats indicated alterations in carbohydrate metabolism represented by activation of the pentose shunt. Determinations of glucose-6-phosphate dehydrogenase activity can, therefore, be used to monitor the degree of hyperoxic and hypoxic stress, as well as adaptation to cold. References 18: 1 Ukrainian, 17 Russian.

[1513-12172]

UDC 591.182:594.9

TWO TYPES OF CHOLINORECEPTORS IN ASCIDIAN MUSCLE OF HALOCYNTHIA AURANTIUM

Leningrad ZHURNAL EVOLYUTSIONNOY BIOKHIMII I FIZIOLOGII in Russian No 3, May-Jun 84 (manuscript received 27 Oct 82) pp 320-323

KOBZAR', G.T. and SHELKOVNIKOV, S.A., Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov, USSR Academy of Sciences, Leningrad, Institute of Marine Biology, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] Data are reported showing that during one season (Aug-Sep), ascidian muscle had two types of cholinoreceptors (CR), one of which was excited with

nicotine mimetics and another which responded to muscarinomimetics. The muscarinomimetics were more active than nicotinomimetics. In another season (Feb-Mar), CR were present which were sensitive to nicotinomimetics only. The most active muscarinomimetic was oxotremorine and the most active nicotinomimetic was propionylcholine. Ascidian muscles were not sensitive to other nicotinomimetics: suberyldicholine, succinylcholine, sebacynyldicholine, imbretyl, decamethonium and nicotine. It is concluded that two types of cholinoreceptors exist in the ascidian muscles: muscarinic and nicotinic. References 5: 2 Russian, 3 Western (1 by Russian authors). [1073-7813]

IMMORTAL MOLECULES

Moscow IZVESTIYA in Russian 19 Jun 84 p 3

MANUCHAROVA, Ye. and TSIKORA, S., Izvestiya Special Correspondents

[Abstracts] Academician Platon Grigor'yevich Kostyuk discusses some aspects of neurophysiological research at the molecular level with emphasis on problems related to cancer prevention and control. A case of repression of a cancer cell taken from the brain using data concerning functioning of the cell at the molecular level is described and the mechanism of restoration of the cell to normalcy after arrest of a tumorous growth is discussed. Further steps required in the fight against cancer are discussed. The importance of developing medicines which will be absolutely specific for only the area being treated is pointed out. These and other advances in genetic engineering will not ensure immortality but they will prolong life and promote the capacity of the organism to restore and regulate itself. The relationship of these studies to thought and consciousness is discussed. [738-2791]

UDC 616.1-02:613.863

EMOTIONAL STRESS AND BLOOD CIRCULATION

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 4, Apr 84
(manuscript received 29 Jul 83) pp 38-45

FEDOROV, B.M., PONOMAREV, Yu.T., STREL'TSOVA, Ye.N., SINITSYNA, T.M., SEBEKINA, T.V., PODREZOVA, N.A., TKACHEV, V.V., DOMRACHEVA, M.V. and BOBKOV, A.S., Moscow

[Abstract] The effects of emotional stress on the cardiovascular system are well documented, and physical fitness has been shown to significantly attenuate the extent of such alterations. Under conditions of long-term hypokinesia (130-145 days) mental exertion has also been shown to elicit similar changes, consisting of tachycardia and elevation of systolic BP to 175-180 mmHg. Additional studies with subjects subjected to bed rest for 182

days and challenged with mathematical problems have shown that even moderate, intermittent exercises can alleviate the effects of hypokinesia. Rhoencephalographic and other studies revealed alterations in cerebrovascular circulation in response to mental exertion, largely consisting of redistribution of blood flow patterns. The changes were highly individualized and dependent on the type of activity (i.e., mathematical operations, verbal tasks, etc.); in general, increased carotid filling was noted with increased tonus of various cerebral arterioles and veins. The changes were reversible immediately on discontinuation of the task. Figures 1; references 33: 32 Russian, 1 Western.

[742-12172]

UDC 612.452.018-06:613.863].017.2

ADAPTATION TO STRESSFUL SITUATIONS AND PREVENTION OF STRESS DAMAGE

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 4, Apr 84
(manuscript received 29 Jul 83) pp 45-51

MEYERSON, F.Z., SUKHIKH, G.T. and KATKOVA, L.S., Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow

[Abstract] A review is provided of the stress mechanisms that have been studied in various animal experiments, and the demonstration that induction of short-term stressful states can exert a protective effect against such manifestations as gastric ulcers, heart damage and depression of killer cell activity (and, hence, of antineoplastic immunity). Evaluation of metabolic features important in stress, such as enhanced lipid peroxidation and hormonal imbalances, have also led to chemical means of stress damage prevention. Treatment of animals with metabolites that have been shown to be functionally important in stress, such as gamma-hydroxybutyric acid, enkephalins, antioxidants, prostaglandins, as well as their synthetic congeners, has also been shown effective in preventing stress-induced pathology. Such a chemotherapeutic approach may open a promising avenue to the prevention and management of a variety of noninfectious diseases. References 22: 16 Russian, 6 Western.

[742-12172]

LEADING EDGE OF NEUROSCIENCE

Moscow IZVESTIYA in Russian 29 May 84 p 3

TUTORSKAYA, S., Izvestiya special correspondent, Bakuriani-Moscow

[Abstract] A tradition has been established among Soviet neuroscientists, viz., an annual meeting in Bakuriani for mutual exchange of ideas and latest research findings in the neurosciences. The meetings include representatives

from a number of other fields, such as mathematics, biochemistry, biophysics, histology, morphology and, even, linguistics, who share some common interest in neurophysiology or some other aspects of the nervous system. Of particular importance to such meetings, in addition to the novelty of new ideas and data, is the prevalence of scientific curiosity which always leads to the formulation of new questions. It is only by means of constant questioning and demanding to know the how and the why that progress can be made.

[681-12172]

BIOMECHANICAL ASPECTS OF FROG WIPING REFLEX

Moscow BIOFIZIKA in Russian Vol 29, No 3, May-Jun 84
(manuscript received 16 May 83) pp 483-488

BERKINBLIT, M.B., ZHARKOVA, I.S., FEL'DMAN, A.G. and FUKSON, O.I., Institute of Information Transfer Problems, USSR Academy of Sciences, Moscow

[Abstract] *Rana temporaria* frogs were used to study the biochemical aspects of the wiping reflex (WR), consisting of a centrally directed series of finely coordinated movements by a hindlimb. The complete reflex consisted of five phases--flexion, lifting, targeting, wiping, extension--with the phases usually interrupted by postural adjustments. In the intact frogs one or several of the phases might be reduced or eliminated under certain conditions without affecting the final result. Such reduction or elimination was, however, seldom seen in the spinal frogs. The multiphasic nature of the movement suggests that the WR is formed by separate functional blocks in the CNS, each of which specifies a particular inter-joint coordination complex.

Figures 3; references 12: 5 Russian, 7 Western.

[1512-12172]

PUBLIC HEALTH

BRIGADE OF MERCY

Moscow IZVESTIYA in Russian 23 May 84 p 3

[Article by M. Fornel', chief physician of the departmental clinical hospital of the Western Siberian Railroad, candidate of medical sciences and meritorious physician of the RSFSR]

[Text] Barnaul--From the article "Nurse" in IZVESTIYA (No 93/94, 1984), one can conclude that the newspaper does not consider the talk about an acute shortage of intermediate and service personnel at medical institutions to be finished. Indeed, the problem remains. I do not, however, think that the problem can be solved through a simple increase in salary. In my opinion, what are needed are more effective active incentives capable not only of keeping the nurse at the hospital but in general of making more effective use of the wage fund of the medical institution to improve medical service.

This reasoning is based on a certain amount of experience. From 1968 through 1974, our hospital (hospital and two polyclinics), along with six other medical institutions of the Ministry of Railways, participated in an economic experiment pursuing the goal, as it appeared to us, of finding just such levers. The conditions of the experiment allowed for some changes in the staff schedule without, of course, increasing the number of positions, in accordance with the production necessity of adding personnel in some sections at the expense of others. It also allowed for more holding of two jobs, changes in the work load, etc. The administration was also given some other important rights. Funds released for the acquisition of inventory and equipment were permitted to be spent in the course of a year (and not quarterly) at the discretion of the institution and proceeding from the real possibilities there. They could transfer funds from one item to another with three exceptions (wage fund, medicine and food). They had the right to sell unneeded equipment and to use the proceeds to purchase what was needed. Finally, they had the very important right to make full use of savings in the wage fund to pay bonuses to the best employees.

I cannot say that the experiment solved all personnel and financial problems. But there is no doubt that the expanded rights were reflected in the quality of our overall work, especially, in the measures of a preventive nature. It was possible to do more observation at the dispensary rather than at the main hospital.

Help at home is an important form of service. For in the dispensary group there are many disabled war veterans, veterans of labor and simply older people who live far from the polyclinics. And what if someone among them has a health certificate? They assigned two more physicians to this form of service to help the one already there. There was a doubling of visits (where the physician goes to the patient and not the other way around).

In time our workers learned to analyze the economic indicators.

All department heads and senior nurses had accounts of their work for the year--to the hour. This helped to perform work with the available forces and sometimes with less. Thus, for example, in a large department, perhaps the therapeutic department, they are supposed to have four nursing positions at all times. We know from experience that in the winter all beds are "working" at full capacity, whereas in the summer the load is reduced, as a rule, by 15 to 20 percent.

They did the same thing with the daily schedules. It is clear that there is more work to be done in the hospital in the daytime than at night. There are medical examinations, treatment is prescribed, medical procedures are carried out, etc. The obvious conclusion was that more nurses are needed during these hours, including in the treatment rooms. But at 10 pm, basically all assignments have been carried out and before morning only the seriously ill patients will require the active attention of the nurse. Consequently, at night it is possible to get along with two or three positions instead of four. Of course it is mainly the patients who gain from such a redistribution of forces. But at the same time, the department saved R 500 to 600 annually in the wage fund.

In a number of services, the biochemical and clinical laboratories existed independently. We combined them. Besides the fact that there was no longer any need for some of the managers, the laboratory assistants learned to do each other's work. In this way, the laboratory saved (even if only a little) by assimilating related jobs.

The amount saved over a year was not very great. However, it was done through the efforts of the collective and it made possible the provision of noticeable incentives to the most outstanding workers. Under conditions of wide publicity, lists were prepared of candidates for bonuses by the department heads with the participation of trade union groups. The bonuses were handed out at the preholiday meetings of the collective.

Since by no means everyone received a bonus, but just the best, there was a rather large sum for each person who did receive a bonus. The main thing is that everyone could see that effort pays off. The overall wage depended directly upon the level of labor activity and the volume of work performed.

At the recommendation of the trade union committee, part of the bonus fund was reserved for material aid to employees. For some they purchased vacations at health resorts and others in difficult living conditions were helped materially.

At the end of the experiment, its results were discussed with the participation of the directors of the medical and sanitary services, the directors of the financial departments of all railroads of the USSR Ministry of Health and the Ministry of Finance. These results were judged to be satisfactory. It was even said that the experiment should be extended to a wider circle of medical institutions. Then everything died down. Here in Barnaul, everything returned "to normal," that is, practically to the situation before the experiment, the only difference being that the administration was given the right to use resources from saving in the wage fund for bonuses, but not more than 1.5 percent. That is a very nominal incentive, for at this time saving is nothing other than the direct result of operating at less than full strength, especially in regard to intermediate and service medical personnel.

They explain to us the strict regulation by saying that the hospital is a budget organization. But what, in essence, is there in this magical "budget" concept that would exclude all economic incentives, especially within the limits of those funds that are allocated to a hospital? And why, if the experiment had such a good effect on the work of the collective, were we not allowed to continue along this path?

There is also the suggestion preliminarily discussed and approved in the collective that amounts to the idea of the brigade method of labor organization. How do we see this initially?

In a large department of the hospital, a group of nurses and orderlies unites into a working group or brigade on a voluntary basis and takes upon itself all of the work intended for a full staff schedule (four nurses and four orderlies) and remunerated in accordance with these eight full salaries. But there may be only five or six people in the working group. Such a relationship, by the way, exists right now, because for some time now it has not been possible to fill a third of the positions of the staffs of service personnel. In any case, nurses are performing part of the work of orderlies (for one-third of an orderly's salary--more is not permitted). On the one hand, this is inconvenient for the hospital, for if a nurse is on duty by days, then when she is resting the department to which she is assigned is not kept in order for a rather long time. On the other hand, a third of a salary is not the kind of sum that would substantially change the overall salary of a nurse. Therefore, many would agree to take on an additional load for appropriate pay.

Thus the nurses unite into a working group and decide themselves how many orderlies to include in the group. The administration obligates itself to pay for a certain volume of work in full, as if it were being performed by all of the people foreseen in the staff schedule. Under the condition, of course, that quality is good for all types of work, something that should be noted in the contract. Under such conditions, of course, each member of the working group must, as they say, take on additional rounds, not slumber an extra hour during the night shift, etc. But we have people of the old breed as well as young people who are accustomed to always working at full strength. Consequently, there is such a reserve.

They may counter by saying that an extra work load will divert the nurse from her immediate duties. But the contract working group will be under strict medical control. It may be that our proposal will evoke other doubts and objections. But is it really better not to seek any way out of the difficult situation that has arisen, not to try anything?

I cannot provide my proposal with more concrete calculations. But if the idea of the brigade method of organizing work and motivating medical service personnel finds support in the appropriate channels, then it would seem that economists will work out the necessary methodology. I am certain that the matter will not lack a practical application. I even ask in advance that our collective be included among the first volunteers.

9746
CSO: 1840/682

ROLE OF PEDIATRIC SERVICE IN GENERAL DISPENSARIZATION OF POPULATION

Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 4, Apr 84, pp 6-8

ORMANTAYEV, K.S. and KHUSAINOVA, SH.N., Kazakh Scientific Research Institute of Pediatrics, Alma-Ata

[Abstract] The decision of the June 1983 Plenum of CC CPSU to cover the entire population of the USSR with annual clinical examinations raises a number of questions about procedure, especially in the area of pediatrics. At present, there are disparities in this service between the urban and rural populations. This is noticed especially through missed diagnoses during the first year of life. Considerable work needs to be done to prepare medical cadres for this monumental task; the program to educate the population needs to be intensified; mobile clinical units may have to be organized to deliver the service to outlying areas. One of the basic problems that needs to be taken care of is the survey of the population followed by classification by age groups of all individuals. To be effective, adequate resources must be made available.

[700-7813]

IMPROVING MEDICAL CARE: IMPORTANCE OF LABORATORY DIAGNOSIS

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 4, 1984 pp 31-33

MEN'SHIKOV, V., professor, rector, Central State Order of Lenin Institute of Physical Culture, and DELEKTORSKAYA, L., doctor of medical sciences, head, All-Union Scientific Methodological and Control Center for Laboratory Affairs, USSR Ministry of Health

[Abstract] Cooperation among the CEMA countries in the field of laboratory diagnosis commenced in 1969, when the specialists in the various countries began to exchange ideas and scientific data. Since then, considerable progress has been made in arriving at unified standards and in setting quality and control criteria for the period 1980-1985, under the auspices of the Standing COMECON Commission. Plans have also been implemented for the formulation of scientific prognostic methods, and the more important results and experiences of the different participating laboratories are published in national and international journals and presented at various scientific

meetings. One of the more significant aspects of such close cooperation among the scientists from the different countries is the familiarity gained with the instruments and reagents produced in the different countries.
[748-12172]

UDC 362.156

CHARACTERISTICS OF WORK ORGANIZATION IN STANDARD STRUCTURE MATERNITY HOMES WITH JOINT RESIDENCE OF MOTHERS AND INFANTS

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 5, May 84
(manuscript received 3 Jun 83) pp 24-27

MALYSHEVA, R.A. and MAL'GINA, A.A., Sverdlovsk Scientific Research Institute of Mother and Child Protection, RSFSR

[Abstract] During the last decade a number of papers have advocated joint residence for mothers with their newborns during the post-delivery period. The results observed in Delivery Home 27 in Sverdlovsk are reported, where the newborn were kept with their mothers in individual rooms. The unit consisted of 200 rooms, 110 of which were assigned to first obstetrical cases, 30--to second cases and 60--to obstetrical complications. It is shown that the level of infections among the infants was significantly lower during their stay in this home and after release to their own homes. Statistical data were reported on a variety of related factors, all indicating the advantages of having babies to stay in isolation with their mothers.
[701-7813]

NEW CEMA MANUAL ON LABORATORY DIAGNOSIS

Moscow EKONOMICHESKOYE SOTRUDNICHSTVO STRAIN-CHLENOV SEV in Russian No 4, 1984 p 33

[Abstract] CEMA specialists on laboratory diagnosis held a meeting in Dresden (GDR) on March 6-9, 1984, which reviewed progress made in this branch of medicine for 1983, and discussed the manual on laboratory diagnosis issued by the CEMA Secretariat. The manual "Laboratory Diagnosis" was edited by professor V.V. Men'shikov and provides recommended procedures to be followed by interested laboratories, establishes quality standards, and lists available reagents and instruments. The manual has been approved by the CEMA Standing Commission on Cooperation in Public Health on July 15, 1983, and can serve as a standard reference source for years to come. The meeting also approved plans for cooperation in the field of laboratory medicine for the years 1986-1990.
[748-12172]

DEVELOPMENT AND IMPROVEMENTS OF PRIMARY MEDICAL-SANITARY SERVICE TO RURAL POPULATION

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 84
(manuscript received 27 Jun 84) pp 7-10

VAL'CHUK, E.A., candidate of medical sciences, Department of Social Hygiene and Organization of Public Health (Director--A.V. Manulik), Belorussian Institute for the Advanced Training of Physicians

[Abstract] The differences between rural and urban medical care go back to 1920's as do the decisions to improve rural health care. The solutions proposed have varied during the intervening years. Recently, stress is put on regional medical services coupled with intensified ambulatory care facilities, rural polyclinics and institutes for primary care. In planning development of the network for rural medical help, a number of factors must be considered: distribution and density of rural population, geographic and climatic conditions, economic and socio-cultural ties among the population, existing network of prophylactic and therapeutic institutes, health status of the population and their specific needs for medical help. References 10 (Russian).

[699-7813]

UDC 614.23:616-053.2:331.81

RATIONAL DISTRIBUTION OF WORKING TIME OF PEDIATRICIANS IN VARIOUS TYPES OF MEDICAL INSTITUTES

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 84
(manuscript received 8 Jul 83) pp 11-14

USTINOVICH, A.K., DERYUGINA, M.P. and KOT, T.I., Belorussian Scientific Research Institute of the Protection of Mothers and Children

[Abstract] During 1981-82, a time study was performed on six pediatricians during 10 working days, analyzing the distribution of their working hours. The results showed considerable overburdening of the physicians resulting in an abbreviated contact between the physician and the patient or his parents. Time was lacking for such things as hand washings or putting on the white coat. A lot of time was wasted on: documentation, business conversations and walking to different areas of the pertinent institute to take care of needed business, conferences, various meetings and other unrelated duties. To improve this situation, suggestions were made to provide means of transportation to the physician, to equip their offices with telephones and to lower the documentation burden.

[699-7813]

EATING FROM BOREDOM

Moscow OBSHCHESTVENNOYE PITANIYE in Russian No 6, Jun 84 pp 44-45

Editorial by EVENSHTEYN, Z.M., docent, physician-dietician

[Abstract] Many papers have been devoted to the problem of overeating and a sedentary life style. In 60-80% of all cases the principal reason for obesity is improper food consumption, favoring animal fats and sugar over vegetable fats, fruits and vegetables. Obesity due to imbalanced nutrition may lead to cardiovascular, CNS and GI disorders. Gradually, obesity is becoming the disease of teenagers. One of the principal causes is eating out of boredom. Rapid dieting may lead to other problems, however: obesity is easier to prevent than to correct. Obesity can be avoided only by a rational diet and active life style. Rational eating must be balanced, it should replace energy losses due to some activity, it should be within limits of the digestive system and contain the substances required by an organism. Energy losses vary by age and sex. Timely food consumption of smaller portions is a good way of controlling obesity, especially if the evening meals are light. In general, one should eat only when hungry and leave the table before getting fully satiated.

[734-7813]

UDC 612.2/.7 + 618.1/-221

EVALUATION METHOD FOR RISK FACTORS DURING PREGNANCY UNDER CONDITIONS OF RURAL THERAPEUTIC-PROPHYLACTIC INSTITUTIONS

Kishinev ZDRAVOOKHRANENIYE in Russian No 2, Mar-Apr 84
(manuscript received 21 Nov 83) pp 26-27

MAZUR, A.D., Sorok Central Rayon Hospital (Chief Physician P.I. Rudenko)

[Abstract] A new method has been developed for estimation of risk factors during pregnancy based on simple observations capable of being handled outside specialized institutions in rural clinics. The method is based on assigning numerical values (0, 1, 2, H) to five factors: socio-biological factor, obstetrical anamnesis, extragenital pathology, course of current pregnancy and development of embryo. A low-risk corresponded to a total score of 0-2 points; a medium risk to 3-4 points and a high risk to 5 points or to an H value in any of the above component factors. This method can be used during the course of pregnancy and might assist in selection of women for specialized care. A retrospective analysis of this method gave satisfactory results.

[698-7813]

HEALTH OF OUR CHILDREN

Moscow IZVESTIYA in Russian 13 Jun 84 p 3

PETROV, Boris

[Abstract] Professor K.V. Orekov, director of the Krasnoyarsk Scientific Research Institute of Medical Problems of the North, USSR Academy of Medical Sciences, Siberian Department, discusses some aspects of the work of the institute with emphasis on the complex program "The North and Human Ecology" which presents an approach to health protection from ecological positions with emphasis on the preservation and improvement of the health of children. The high incidence of myopia in the north is pointed out and the contribution of environmental factors of the region to this disease is discussed. The contrast between conditions experienced in the natural environment and those experienced in the school environment is emphasized. The importance of physical education and special eye exercises and visual training for school children is emphasized. Problems arising from a sedentary life style are discussed.

[739-2791]

NEONATOLOGY IN USSR

Moscow IZVESTIYA in Russian 20 Jun 84 p 3

TUTORSKAYA, S.

[Abstract] Following an interview with Academician V. Tabolin [Izvestiya, No 85/86] on the state of neonatology in the USSR, IZVESTIYA received many letters from concerned pediatricians, parents, ordinary citizens, and comments from appropriate ministerial bodies. In essence, the parents and physicians wrote in support of Tabolin's contention that much more needs to be done than is currently being done to preserve infant health and wellbeing. In addition, many manufacturing and other enterprises wrote letters of support with offers to provide whatever instruments and drugs may be needed in the practice of neonatology. Despite the encouraging words from the research institutes and administrative bodies, it remains a fact that research on infant health is a neglected field, and that it is difficult to encourage young graduates of medical institutes to enter it. IZVESTIYA and its readers wait to hear of concrete plans designed to alleviate this state of affairs, particularly from such influential bodies as the USSR Ministry of Health and the USSR Academy of Medical Sciences.

[737-12172]

EMERGENCY MEDICAL SERVICES IN LATVIA

Moscow PRAVDA in Russian 24 May 84 p 3

MESHKOV, O., PRAVDA correspondent, Latvian SSR

[Abstract] An overview is provided of the organization of emergency medical services in the Latvian SSR. In Riga and in six other major cities in the republic an emergency station has been established, with similar facilities existing at central rayon hospitals. This system, then, allows for a rapid response to calls from villages and even isolated farms. A check-and-balances system has been established to monitor the quality of medical care, and seminars and other measures are employed to improve and maintain postgraduate education. More recent technical improvements have been concentrated on telecommunication between the emergency stations and ambulances, and the RAF automobile plant has been engaged in the design of special microbuses to serve as ambulances equipped for rendering cardiopulmonary resuscitation.

[741-12172]

LOCAL HEALTH RESORTS

Moscow SOVETSKAYA ROSSIYA in Russian 10 Jul 84 p 1

MIKHAILOV, Mikhail, SOVETSKAYA ROSSIYA personal correspondent for Chita Oblast and Buryat ASSR

[Abstract] An analysis of the state of the health resorts in Chita Oblast and the Buryat ASSR reveals a dismal picture. Instead of being developed and expanded to their full potential, resorts such as Darasun, Arshan, Shivanda, Baykalskiy Bor, Kuka and others are permitted to stagnate. The fact that they are visited by some 70,000 people a year is simply due to the drawing power of their curative waters and mud baths, rather than to any physical attributes of the facilities themselves. Invariably, the rooms are small and uncomfortable, and other amenities are also lacking. A large portion of the blame must be placed on the shoulders of the building and construction enterprises, that can take decades to build a two-story building and even then fail to complete the project. To meet the directives of the Communist Party of the Soviet Union in improving the health and living standards of the Soviet people, the responsible local authorities must show a more statesmanlike stance and assume responsibility for their actions.

[737-12172]

SOME MORTALITY CHARACTERISTICS OF LARGE CITY POPULATION

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSTII in Russian No 4, Apr 84
(manuscript received 25 Apr 83) pp 16-19

POLYAKOV, I.V., SOKOLOVA, N.S., BOYARINOVA, Ye.A. and PETROVA, N.G., Department of Social Hygiene and Organization of Public Health (Director--Prof. V.A. Minyayev) First Leningrad Medical Institute imeni Academician I.P. Pavlov

[Abstract] The mortality index in large northwestern cities of the European USSR is higher than in the south and in Central Asia. These higher mortality rates are accompanied by lower birth rates and conversely lower mortality in the south goes along with higher birth rates. The mortality rates appears to be on the increase in recent years and the population, on the average, grows older. More specifically, the mortality among men is higher than among women, especially in the 40-49 years group. The leading causes of the mortality are the cardiovascular diseases and cancer. Trauma and accidents often alcohol-related, appear to be growing causes of mortality in recent years. Most important factors isolated in this study are: Bodily characteristics, change in life style and environmental effects. The following factors were identified among the risk factors: seriousness of the disease, late therapeutic intervention and improper treatment. Some of them can be controlled, some cannot. In general, increased life expectancy can be achieved by a total program, including medical, social and state measures. References 5 (Russian). [702-7813]

EVALUATION OF SANEPID STATION ACTIVITY IN CHILD AND ADOLESCENT HYGIENE

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 4, Apr 84
(manuscript received 12 Aug 83) pp 20-25

TUROVETS, G.L., Scientific Research Institute of the Hygiene of Children and Adolescents, USSR Ministry of Health, Moscow

[Abstract] There are a number of standard measures by which the activity of Sanepid [sanitary-epidemiological] stations could be evaluated: subject coverage by the sanepid station service, frequency of examinations, physician's visits, number of laboratory and instrumental tests performed in a given time, etc. Nevertheless, upon closer scrutiny variations in these indices were noted among various stations. The theme of this paper was that eval' . on of the activity of sanepid station specialists should consider a totality of indices of operative activity characterizing the overall effort in sanitary supervision. These indices should reflect results achieved in the wellbeing of the population and in improved health status of children and adolescents. Figure 1; references 8 (Russian). [685-7813]

STATESMANLIKE ATTITUDE TO MASS SCREENING

Frunze SOVETSKAYA KIRGIZIYA in Russian 13 Jun 84 p 4

YESINA, L., Uchastok Physician, No 3 City Polyclinic, Frunze

[Abstract] The success of the Soviet mass health screening program [dispensarization] depends on the whole-hearted involvement of physicians and government and party workers in meeting their responsibilities. The author recounts her personal interest in the program in her uchastok, and the steps she takes to monitor the population. The importance of the psychological factor in such a program cannot be underestimated, and requires appropriate public health education of the population. Recognition that one's personal health is an important factor in the welfare of the entire state is an important stimulus to seeking medical attention and participating in the program on a voluntary basis. A physician who understands this and participates in such educational efforts is truly acting in a statesmanlike manner.

[667-12172]

PSYCHOLOGY

INTERNATIONAL CONFERENCE ON BEHAVIOR AND EMOTIONS

Moscow VECHERNAYA MOSKVA in Russian 27 Jun 84 p 3

[Article by B. Yakovlev, "Oh These Emotions!"]

[Text] We live in a world of emotions: they rage within us and around us. They are put into gear by noble impulses and the sharp elbow of a neighbor on a streetcar. Positive and negative emotions, emotional stresses and their causes and consequences are studied by major scientists.

This morning those who were assembled in the conference hall of the Hotel Kosmos heard two reports: "Emotions in the Systematic Organization of Result-Producing Behavioral Acts" and "From Descartes to Sechenov, Botkin, Pavlov and Anokhin: The Theory of Nervism and the Development of Systematic Concepts in Biomedical Sciences." The reports were made by known specialists: the first by K. Sudakov, corresponding member of the USSR Academy of Medical Sciences, and the second by S. Korson, an American professor.

This was the plenary session of the International Soviet-American Pavlov Conference, dedicated to the memory of the prominent physiologist and academician Petr Kuz'mich Anokhin.

The conference was held by the USSR Ministry of Health, the USSR Academy of Medical Sciences, the All-Union Physiology Society imeni I.P. Pavlov, the Institute of Normal Physiology imeni P.K. Anokhin and others, together with the American Pavlov Society. This society was created in the United States by followers of our great compatriot, and his legacy is actively publicized and developed, uniting noted American and foreign scientists, including Soviets.

The work of six sessions began after the plenary session.

The conference will end on Friday with a plenary session with the reports "Pavlov and Cannon--Founders of the Physiological Interpretation of the Problem Behavior and the Autonomic Nervous System" (Ch. Brooks, United States of America) and "From Pavlov's Conditioned Reflex to Anokhin's Theory of Functional Systems" (N. Nikolov, Bulgaria).

More than 60 foreign scientists from 17 countries are participating in the conference "Emotions and Behavior: a Systematic Approach".

PSYCHOPHYSIOLOGICAL RELAXATION ROOMS

Moscow AVTOMOBIL'NYY TRANSPORT in Russian 5 May 84, pp 23-24

VAYSMAN, A., doctor of medical sciences, SHENDERova, I. and DYATLOVA, K., Gorkiy Scientific Research Institute of Labor Hygiene and Occupational Diseases

[Abstract] A summary is presented of the current practice of providing truck drivers with rest and relaxation rooms to alleviate the strain and stress of their occupation. Current estimates indicate that such practices reduce accidents and work-related diseases, while increasing productivity by some 17%. At the present time such rooms are being established in a random fashion at the various enterprises without a centralized approach and a unified scheme of activities. All too often they simply provide for passive relaxation with background music, movies and/or slide shows, without any provision for physical exercise. Steps must be taken to improve such facilities to provide medically-supervised autogenic training and opportunities for exercise, along with other amenities necessary to ensure optimum mental and physical status within a pleasant environment.

[736-12172]

UDC: 577.391:591.473

USE OF HELIUM-NEON LASERS TO STIMULATE REGENERATION OF SKELETAL MUSCLE
DAMAGED BY IONIZING RADIATION

Moscow RADIobiologiya in Russian Vol 23, No 1, Jan-Feb 83 (manuscript received 29 Jun 81) pp 50-53

[Article by M. F. Popova, N. V. Bulyakova and V. S. Azarova, Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow]

[Text] A comparative study was made of therapeutic effects of regenerative muscle tissue transplants and delivery of helium-neon lasers to skeletal muscle exposed to x-radiation in a dosage of 20 Gy. The results of four series of experiments revealed that lasers have the same stimulating effect on the irradiated rat gastrocnemius submitted to complete transverse myotomy as transplantation of shredded muscle tissue to the region of the muscular defect. In both instances, the process of regeneration of irradiated muscle is normalized to such an extent that the formed muscular organ differs little from a control nonirradiated regenerated muscle.

By virtue of the successful development of radiobiology, we now know of many elements in the mechanism not only of radiation damage, but recovery on different levels, from the organism to subcellular levels. These data are used to develop methods of treating radiation sickness. However, there are still rather limited possibilities of normalizing structural-metabolic and regulatory processes in tissues and organs impaired by high doses of local radiation. For example, delivery of more than 15 Gy radiation to the mammalian limb elicits severe depression of proliferative activity of tissues and capacity for posttraumatic regeneration, not only of skeletal muscles but the integument. As a result of mechanical trauma, muscle is replaced with connective tissue, and an ulcer that does not heal for a long time is formed on the skin [1-4]. In order to search for a means of stimulating regenerative processes in the rat gastrocnemius exposed to 20 Gy radiation and total transverse myotomy, we tested the effect of a shredded muscle tissue transplant in different conditions--normal preserved according to V. P. Filatov, heated to 70°C--into the defect of this muscle, as well as the effect of pyrogenal and multiple vitamins. However, a stimulating response was obtained only with transplantation of normal shredded muscle tissue capable of regeneration [3, 5, 6].

In recent years, it was established that low-energy helium-neon lasers can stimulate recovery processes in organs and tissues stricken by a number of pathological processes. However, the effect of red rays from this low-energy laser on body tissues after exposure to ionizing radiation has not been sufficiently investigated. The data in the literature concerning effects of helium-neon lasers on the irradiated organism are indicative of the potential value of further investigations in this direction [7-10].

We compared here the therapeutic effect of transplanting shredded muscle tissue and delivering helium-neon lasers on skeletal muscle exposed to a high dose of γ -rays.

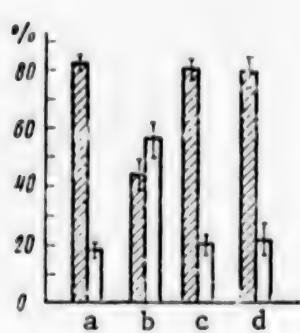
Material and Methods

The object of our studies was the gastrocnemius muscle of white mongrel male rats weighing 120-140 g. One or both hind limbs of the animal were exposed to radiation in a dosage of 20 Gy delivered by an RUP-200 unit, voltage 190 kV, current 15 mA, dose rate 0.67 Gy/min, 0.75 mm Al and 0.5 mm Cu filters. On the same day, we performed total transverse myotomy of the gastrocnemius. For this purpose, under nembutal anesthesia, we shaved the fur off the dorsal surface of the rat's legs, made a longitudinal incision in the skin and covering muscle, then severed the gastrocnemius. After this, we applied a continuous suture to the covering muscle and skin, which was swabbed with iodine and dusted with sulfanilamide. In all, we performed four series of experiments on 54 animals. In the first series, we only severed both muscles; in the second, both limbs were exposed to 20 Gy radiation before myotomy; in the third, the right extremity was exposed to the same dose of radiation, the muscle was transected and shredded tissue from the left, nonirradiated muscle was placed in the formed defect; in the fourth series, both hind legs were exposed to 20 Gy radiation, the gastrocnemius muscles were severed and then they were exposed to LG-75 lasers at an energy flux density of 1 mV/cm² for 2-5 min daily for 2 weeks. The studies were conducted 2 weeks, 1 and 2 months after the operation. Before sacrificing the animals, under nembutal anesthesia we perfused the vessels with India ink and gelatin, then the muscles were fixed in Carnoy solution or 10% formalin. Sections were stained with iron hematoxylin according to Rego with additional staining according to Mallory, as well as silver impregnation according to Bielschowsky-Gross-Lavrent'yev in the modification of Viktorov. On preparations stained in this manner, we observed change in progress of regeneration of homologous muscle and connective tissue, as well as nerves and vessels of the muscle. In addition to histological analysis of regenerative muscle, we made a morphometric analysis of percentage of muscle and connective tissue elements in the muscles under study, according to ratio between areas occupied by them on the sections.

Results and Discussion

In the first series of experiments, there was active regeneration of muscle fibers in the proximal stump 2 weeks after transection of normal muscle. Myosymplasts and muscle tubes penetrated far into the defect between the proximal and distal stumps filled with granulation tissue. Muscle nuclei were round and contained large nucleoli, which is indicative of intensive synthesis of RNA and proteins. The area of regeneration was profusely supplied with vessels

and regenerative axons. One month after transection, the regenerative process in the muscle was largely terminated. The area of the injury was filled with differentiated striate muscle fibers, and layers of dense connective and fatty tissues were visualized only in a few places. The regeneration zone was permeated by numerous vessels, and it was well-innervated. Axons formed motor plates differing in maturity on muscle fibers. After 2 months, the proximal and distal stumps were firmly united by regenerated muscle fibers and had the appearance of a single muscular organ containing $82 \pm 2\%$ muscle tissue and $18 \pm 2\%$ connective tissue (Figure, a).



Percentage of muscle (striped bars) and connective tissues (white bars) in 2-month regenerates of different series of experiments

- a) transverse myotomy without irradiation
- b) 20 Gy radiation and transverse myotomy
- c) 20 Gy radiation, transverse myotomy and transplantation of nonirradiated shredded tissue to region of defect
- d) 20 Gy radiation, transverse myotomy and laser therapy

In the second series of experiments, irradiation of the animal's limb in a dosage of 20 Gy elicited drastic impairment, not only of proliferative activity of tissues, but tissue regulation, without which regeneration is impossible. After 2 weeks, the irradiated tissues appeared to be "stagnant," and they virtually failed to react to mechanical trauma. There was marked delay in the process of purification of the wound and formation of granulation tissue, which is instrumental in suppuration of the wound. The muscle stumps were edematous and there was vacuolar disintegration of muscle fibers. Small muscle buds with 1-2 deformed nuclei could be encountered on some of them. Axons gave off from the nerve trunk closest to the myotomy site and they often formed a neuroma. After 1 month, the regeneration process was markedly inhibited and distorted. Some myosymplasts projected from the end of the proximal stump into a narrow zone circumscribed by dense connective tissue filling the defect. The distal stump of the muscle was atrophied or completely replaced with connective tissue. Two months after trauma, the proximal stump was appreciably reduced in size, while the distal stump was usually already atrophied and replaced at this time with connective tissue, just like the defect area, which constituted $56 \pm 5\%$, whereas muscle tissue constituted only $44 \pm 5\%$ (Figure, b). The traumatized and irradiated muscle was several times smaller than the severed nonirradiated muscle, and it could not perform its normal contractile function. It should be noted that exudative edema of the skin of the irradiated limbs, slow fusion of incision edges and suppuration of the wound were observed in virtually all of the animals in the second series of experiments. Skin or skin and muscle ulcers developed in over half the experimental rats.

In the third series of experiments, there was an active regenerative process after irradiation, transverse myotomy of the gastrocnemius and autotransplantation of shredded muscle tissue into the defect. After 2 weeks, the defect was

filled with myosymplasts with large nuclei; here and there some muscle tubes with beginning signs of transverse striation were encountered. There was also regeneration in the stumps of the traumatized muscle. Myosymplasts projected from the proximal stump, which traveled far into the region of the defect and connected with myogenic elements of transplanted tissue. The myosymplasts in the distal stump that were growing into the defect were thinner and contained fewer nuclei. The defect region was permeated with vessels and regenerative axons. After 1 month, virtually the entire defect region was filled with bundles of young muscle fibers separated by insignificant layers of connective tissue. Regenerative tissue transplanted into the defect joined the stumps of the severed muscle into a single contractile organ. There was reinnervation of the distal muscle stump. After 2 months, the regeneration process as a whole had ended. The regenerated muscle fibers in the defect, as well as in the proximal and distal stumps, present distinct transverse striation, they are well vascularized and innervated. There was 4 times more muscle tissue in the regenerated muscle than connective tissue-- $80\pm2\%$, versus $2\pm2\%$ (Figure, c).

In the fourth series, where the irradiated and severed muscle was submitted to laser therapy, we obtained results indicative of restoration of regenerative capacity. Two weeks after the operation, there was an active regenerative process in muscle tissue of the proximal stump. Muscle buds formed on the muscle fibers of the distal stump. Vessels grew into the regeneration area, young axons appeared with growth "cones" at the ends. After 1 month, the area of the defect was already totally free of fibrin and filled with myosymplasts and young muscle fibers regenerated from the stumps of the injured muscle. After 2 months, it was already difficult to discern the boundary of the proximal stump because of its intensive regeneration. *De novo* tissues were completely differentiated. The defect was entirely filled with striate muscle fibers and insignificant layers of connective tissue. The distal stump was not atrophied, as it was in the irradiated and traumatized muscle without laser therapy, and consisted mainly of differentiated muscle tissue. All of the restored muscle was vascularized and innervated. It contained $79\pm4\%$ muscle tissue and $21\pm4\%$ connective tissue (Figure, d). No myodermal ulcers were formed in this series of animals.

According to the results of this study, helium-neon lasers restore proliferative and regenerative activity of skeletal muscle damaged by ionizing radiation. On the basis of data we previously obtained concerning the effect of lasers on irradiated tissues [10], it can be assumed that the therapeutic effect of lasers, which was established in this study, is based on enhancement of the cells' capacity for recovery from radiation damage. The mechanism of this effect has not yet been fully investigated; however, it has been established that helium-neon laser beams intensify respiratory processes in cells and ATP synthesis [11, 12]. The significance of energy metabolism to processes of postradiation recovery has been experimentally demonstrated [13, 14]. There are also direct data to the effect that red light at a wavelength of over 600 nm elicits intensification of DNA repair in human leukocytes and fibroblasts after damage by ultraviolet light [15].

A comparison of the results of the third and fourth series of experiments shows that laser beams have the same stimulating effect on severed and

irradiated muscle as implantation of regenerative shredded muscle tissue into the region of the muscle injury. In both instances, muscle regeneration is normalized to such an extent that the formed muscular organ is virtually the same as a control regenerate of nonirradiated traumatized muscle. These data warrant the assumption that the stimulating effect of the physical and biological agents we used are based on the same property, the capacity to eliminate the sequelae of radiation trauma.

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CONFERENCE

ALL-UNION CONFERENCE ON THEORY OF FORMATION OF SIZE AND WISE USE OF COMMERCIAL FISH STOCK

Moscow VOPROSY IKHTIOLOGII in Russian No 3, May-Jun 84 (signed to press 25 Apr 84) pp 519-523

[Article by B. S. Berdichevskiy and B. G. Ioganzen]

[Text] The All-Union Conference on Theory of Formation of Size and Wise Use of Commercial Fish Stock convened in Moscow from 25 to 27 October 1982; it dealt with basic problems of modern ichthyology and biological piscicultural science as a whole. The conference was organized by the USSR Academy of Sciences (Scientific Council for Problems of Hydrobiology, Ichthyology and Utilization of Biological Resources of Reservoirs, Institute of Evolutionary Morphology and Ecology of Animals, Zoological Institute), USSR Ministry of the Fish Industry (Ichthyological Commission, All-Union Scientific Research Institute of Marine Fisheries and Oceanography) and USSR Ministry of Higher and Secondary Specialized Education (Moscow State University).

There were 307 participants in the conference (38 of whom are doctors of sciences and 152 candidates of sciences) from 83 institutions and organizations, including 45 from the system of the USSR Ministry of the Fish Industry, 7 from the RSFSR Ministry of the Fish Industry, 11 from the USSR Academy of Sciences, 5 from academies of sciences of Union republics, 11 from the USSR Ministry of Higher and Secondary Specialized Education and 4 from other agencies.

The conference began with the opening remarks of V. M. Kamentsev, USSR minister of the fish industry. He observed that the USSR Food Program, which was approved by the May (1982) Plenum of the CPSU Central Committee, has put major tasks to the fish industry pertaining to increase in food resources of our country. It would be impossible to perform these tasks without the proper scientific and technical potential. The ministry attributes much importance to this conference, which it regards as an important event in the development of Soviet biological piscicultural science. The conference deals with a key problem, that of establishing a firm and stable raw materials base in order to successfully perform the tasks put to this sector.

At the 6 sessions 19 plenary papers were delivered (prepared by 41 specialists) and more than 30 poster sessions. A total of 35 people participated in the discussions.

In the survey of L. S. Berdichevskiy, T. F. Dement'yeva, B. G. Iogansen, Ye. A. Kriksunov and T. S. Rass on the topic of "History of Development and Current Status of Theory of Formation of Commercial Fish School and Its Wise Exploitation," it was shown that scientific theory of population dynamics makes it possible to foresee changes in composition of the population of fish and other components of aquatic ecosystems, which could occur both under the influence of natural factors and as a result of man's economic endeavors. Development of theory of dynamics of fish population is most closely linked with solving the problem of scientifically validated control of fishing and wise use of fish stock.

The research of F. I. Baranov, A. V. Derzhavin, G. N. Monastyrskiy and G. V. Nikol'skiy played a large part in development of current conceptions of dynamics of fish stock. The first and second All-Union conferences on dynamics of commercial fish population were important stages in summarizing the results of research (1951, 1960), when it was possible to formulate conceptions of the type of dynamics of fish schools, as a species-specific adaptive property assuring the existence of a population under environmental conditions that change within a specific amplitude. At the same time, in the conclusions of these conferences, it was noted that the scope and effectiveness of research in some areas of this extremely important problem still do not meet the demands of the rapidly developing fish industry.

In the last two decades, studies have been made of questions of renewal and decline (natural and as a result of fishing) in stock of different commercial fish; conditions have been defined of fish existence in early ontogenesis; studies have been made of the reasons for different survival rates in different generations, patterns of growth and maturation of fish, as well as availability of food for them.

Questions pertaining to the status of research in the area of population dynamics and methods of controlling fishing as related to inland waters of the USSR merit special attention. There is still a lag in this important area, the cause of which is, in part, the persisting tendencies that guided the fish industry primarily to the extensive route of development. The very nature of fishing also leaves much to be desired; it is often practiced without adhering to the basic principles of rational utilization of fish stock.

Several plenary papers shed comprehensive light on different aspects of the problem of formation of size and rational use of fish stock. P. A. Moiseyev, in a paper entitled "Role of Fish Present in Large Number to Worldwide Fishing," demonstrated that, of the 495 families and more than 20,000 species of worldwide ichthyofauna (about 1500 of which have or are capable of having commercial significance), the most significant catch (40-50%) is referable to representatives of 2-5 families and no more than 15 species. For this reason, investigation of fluctuation in number of, for example, such saltwater fish as the Pacific pollock and pilchard [*Sardinella melanostica*], North Atlantic capelin and *Micromesistius*, as well as the Peruvian horse mackerel, is acquiring particular importance.

"Synecological Bases of Dynamics of Population Size of Widespread Species in Fishing and Geographic Complexes" were discussed in the paper of T. S. Rass.

Now, with the increased technical capacities of fishing, some of the conceptions previously formed as a result of analysis of autoecological data in the period of mild impact of fishing on fish stock are no longer adequate. At the present time, it is necessary to take into consideration other than the previously existing phenomena in the dynamics of population size of commercial species. We refer, for example, to the difficulty of restoring the impaired population of commercial species only by initiating fishing (for example, for the Far East flounder, Norwegian and Murmansk herring), need for strict limitation of fishing region (for example, the region of fishing for capelin and the western waters of the Barents Sea to restore entry of cod east of the North Cape), unwarranted expectation of an appreciable increase in population of feed species as a result of catching the predator species that feed on them (demonstrated, for example, by the lack of increase in number of anchovies after catching the Black Sea dolphins).

V. V. Kuznetsov and M. V. Mina reported on "Investigations of Population Structure as Related to Problems of Dynamics of Fish Stock." In the authors' opinion, any changes in habitat and any influence on size of schools, either to reduce it (fishing) or increase it (pisciculture) also affect and alter the population structure of schools to some extent or other. In the interests of the fish industry, a school should be maintained in such a state as to make the fullest possible utilization of resources in its environment and retain an optimum composition from the economic point of view.

T. V. Dement'yeva and K. A. Zemskaya characterized "the significance of factors unrelated to density in formation of renewed stock of fish with high fertility." Fluctuations in renewal level of fish and, in particular, species with high fertility depend on reproduction conditions and changes in them. The enormous fertility of these fish is an adaptation that compensates for the high death rate in early ontogenesis. A slight reduction in it under conditions that are optimum for a species leads to significant increase in number of specimens in the generation. This distinction is the main argument in favor of the relevance of environmental conditions as the dominant factor with respect to quantity and quality of producers.

The paper of Ye. A. Kriksunov and M. A. Snetkov dealt with "theory of replenishment and interpretation of many-year dynamics of a school of fish." The main factors in dynamics of a school are growth, mortality and reproduction, and in a number of instances reproduction is the prime factor. Population dynamics are formed as a result of interaction between self-regulating fluctuations and dynamics of exogenous factors.

T. V. Dekhnik, V. P. Serebryakov and S. G. Soin shed light on the "significance of early developmental stages to formation of number of specimens in generations."

In their paper, M. V. Zheltenkova, A. V. Kogan, O. A. Popova and M. I. Shatunovskiy discussed "trophicological aspects of fish population dynamics," showing that fish population dynamics depend largely on availability of food. The dynamics of the feed base in bodies of water largely determines the commercial stock and catches of fish. For this reason, trophological studies are a necessary and important element of modern ecological monitoring, without which it is impossible to comprehend and properly assess processes that occur in aquatic ecosystems, particularly under the effect of man.

In a paper entitled "Scientific Bases for Regulating Fishing and Rational Utilization of Fish Stock," L. S. Berdichevskiy and B. G. Logansen touch up a wide range of issues making up the principal result of research on fish population dynamics. Regional rules for fishing are of utmost importance to protection of fish stock, assuring its reproduction and rational organization of fishing. They are being continuously refined on the basis of the results of biological studies of fishing and serve as the principal means of controlling fishing.

Wise utilization of fish stock could be based both on natural reproduction, in the presence of spawning grounds, and artificial reproduction in the case of shortage or loss of natural spawning places. Scientifically validated regulation of fishing makes it possible to base fishing on catching the older groups of a school, which have usually already spawned. There are quite a few positive examples of a significant effect from proper regulation of fishing. For example, the ban on marine fishing for sturgeon in the North Caspian Sea (where up to 99% of the catch was referable to young specimens) led to significant increase in catch and 10-fold increase in roe yield. Without proper attention being given to questions of controlling fishing, there are instances of mass scale catching of producers during the period of spawning migration and gathering roe for pisciculture purposes), use of unlimited number of fishing gear, some of which is quite destructive, removal of large quantities of young age groups of commercial fish that have not reached either sexual maturity or commercial value. Proper regulation of fishing requires ecological forecasting of the consequences of different factors on the school of commercial fish.

The paper of A. V. Lukin and V. A. Kuznetsov shed light on the "patterns of dynamics of fish population in reservoirs." Regulation of river effluence altered appreciably the hydrological and biological processes in reservoirs. The fish populations adapted to this by changing the rate of growth, spectrum of nutrition, time of sexual maturation, reproductive cycle and fertility. It has been established that the range of fluctuations in number of stenobiont species (zope, pike) is broad, while in eurybionts (bream, roach, pike-perch) it is narrow, and this is related to adaptation of populations to preservation of their size and reflects the variability of their habitat. Improvement of natural reproduction of fish by changing water levels in reservoirs, improving spawning sites, developing controlled spawning sites and implementing protective measures, as well as intensifying artificial reproduction, make it possible to regulate the size of fish stock in reservoirs and use it more wisely.

"The specifics of fish population dynamics in large lakes and lowland reservoirs" were discussed in the paper of L. A. Kuderskiy. Large lakes and lowland reservoirs inhabited by valuable commercial fish (salmon, whitefish, species caught in large-mesh nets) are of commercial importance since they yield over 55% of the fish from inland bodies of water in the country. The fish that live in them can be divided into species with short and long life cycle, depending on biological structure of the school and nature of population dynamics. Among those with long life cycles, a distinction is made between lake and lake-river species that require different conditions for reproduction. Development of demecological studies provides the conditions for scientifically validated evaluation of productive processes in inland reservoirs and permissible range of their deformation under the influence of man's endeavors.

I. V. Nikonorov reported "on biological bases of rational use of fish stock and regulation of fishing in USSR inland waters." Biologically proper exploitation of fish stock must be based on determination of its total size and permissible removal of commercial portion of stock, determination of forbidden areas, times and methods of fishing, setting minimal permissible size (commercial gage) of target fish, establishment of permissible number of young specimens in catch. Attention was called to absence of reliable methods of counting fish, which often leads to errors in assessing commercial stock.

A. G. Poddubnyy, L. K. Malinin, A. S. Strel'nikov, I. I. Lapitskiy and K. I. Yudanov characterized "fish population density in open stretches of water in the Volga and Don." In their paper, they compared direct estimation of fish population density based on test catches to sonar-obtained data, demonstrating the efficacy of the latter and need to adopt it in ichthyological studies.

In the paper of Ye. M. Malkin, "Methodological Bases of Theory of Dynamics of Fish Populations," attention was called to existence of different empirical and mathematical methods of determining the number of fish, in which the inductive approach is not infrequently set against the deductive one, although a wise combination of both is needed.

The paper of V. M. Borisov was entitled "Natural Mortality as a Factor in Dynamics of Size of Commercial Fish Populations." Natural mortality is still little-studied because of a number of methodological difficulties. Determination of this very important population indicator is of greatest relevance because it permits evaluation of absolute size of stock on the basis of relative estimates.

"Theoretical Bases of Regulating Fishing" was the topic of V. K. Babayan, R. G. Borodin and Yu. N. Yefimov. Problems of controlling the stock are solved by means of mathematical models of fishing. For regulation purposes, one usually uses optimization models which permit quantitative validation of optimum conditions for fishing on the basis of biofishing statistics or preliminary estimates of parameters of the targeted fish population.

V. P. Ponomarenko, I. Ya. Ponomarenko and N. A. Yarygina dealt with the problem of "altering growth and sexual maturation of cod in the Barents Sea on the basis of data covering many years." In the last decades, a tendency toward inverse relationship between population density and mean size of cod and a relationship between feeding and growth rate indicators have been established.

In the paper of I. B. Birman, "Investigation of the Role of Pacific Salmon and Their Relations With Herring in the Ecosystem of the Shelf Zone of Far East Seas," it was shown that the distribution of salmon stock coincides with that of herring in the northern part of the Pacific Ocean, and that there is a link between the long-period fluctuations in number of these fish and cycles of solar activity.

A. A. Yelizarov, who delivered the last plenary paper, "Perennial Fluctuations in the Atmosphere, Hydrosphere and Biosphere of Different Parts of the World Oceans," demonstrated the exceptional role of periodic fluctuations of solar activity in determination of the dynamics of different natural processes that occur on earth.

The vast and diverse material contained in the papers delivered at the plenary meetings was significantly enlarged upon by 2 days of poster papers.

A large group of these papers was devoted to investigation of the feed base and status of fish stock in the North Atlantic, North, Baltic, Norwegian, Barents and White seas. There was discussion of the dynamics of species diversity of ichthyoplankton in the Barents and Norwegian seas (V. K. Aldonov, V. P. Serebryakov), reproduction of the stub-nosed Macrurus in different parts of the North Atlantic (G. V. Grigor'yev), stock of north Baltic herring and environmental factors (B. K. Yevtyukhova, M. N. Lishev), results of quantitative estimation of pelagic fish in the Atlantic Ocean (A. A. Nesterov, V. N. Chur), spawning conditions of the silver hake in the region of the Georges Shoal (A. S. Noskov), distinctions of formation of generations of the White Sea herring (V. V. Pokhilyuk), distribution and stock of benthonic fish species of the Yucatan bench in the Gulf of Mexico (V. I. Sauskan), annual changes in growth rate of the sprat and replenishment of the commercial stock as related to temperatures in the North Sea (V. N. Fel'dman), etc.

In recent years, Soviet ichthyologists have devoted some attention to the study of fish in the Indian Ocean. They have examined various aspects of biology and population size of the yellow-finned (B. N. Kuz'min, S. M. Pronenko) and large-eyed (P. B. Tankevich) tuna in different parts of the Indian Ocean, notothenoid fish as related to differences in food availability in the Atlantic and Indian Ocean sectors (K. V. Shust).

The poster reports, "Changes in Benthonic Ichthyofauna of the Vancouver and Washington-Oregon Regions Related to Trawling for Sea Perch and the Pacific Hake" (Yu. K. Yermakov) and "Role of Zooplankton in Forecasting Commercial Accumulations of Herring in the Northwest Bering Sea" (E. R. Shaginyan) were concerned with the basin of the Pacific and Bering Sea.

Interesting data were contained in the poster reports dealing with the Volga-Caspian and Azov-Black Sea basins. They discussed natural reproduction of the sturgeon under modern conditions and its role in forming the commercial stock of this species (A. D. Vlasenko), changes in structure of fish populations in the Central and Southern Caspian under the influence of anthropogenic factors (Z. M. Kuliyev), ecological aspects of behavior of young sturgeon as related to formation of its population size in the Caspian (A. V. Levin), effect of anthropic factors on ichthyofauna and fish population size, and its regulation in the Volga-Caspian region (A. P. Slivka, A. V. Pavlov), dynamics of fish population in the lower part of the Volga Delta with regulated effluence (L. N. Tryapitsyna, L. P. Kizina), biological validation of status of fishing stock referable to sturgeon and determination of permissible fishing limits in the Volga-Caspian region (R. P. Khodorevskaya).

Among inland bodies of water, storage basins draw the most attention. There were two poster papers dealing with general questions: "Some Aspects of Fishing in Inland Waters" (E. R. Pikh) and "Effect of Anthropic Factors on Ichthyofauna of USSR Continental Reservoirs According to Archeological and Historical Data" (Ye. A. Tsepkin, L. I. Sokolov). One paper was concerned with rivers, "Determination of Size of Spawning Schools of Vendace in the Yana River" (A. I. Lutsik). There were three papers dealing with lakes: "Effect of Fishing on Size and Structure of Fish Population in Syamozero" (V. F. Titova, O. P. Sterligova), "Effect of Fishing on Population Structure of Lake Fish" (V. A. Fedorov, G. I. Polyakova) and "Biological Aspects of the Problem of

"Augmenting the Population of Lake Sevan Trout" (A. I. Smoley). There were seven papers dealing with water storage basins: "Characteristics of Bream Population in the Rybinsk Reservoir According to Growth Indicators" (A. I. Goncharov), "Mathematical Model of Fish Community on the Example of the Kapchagay Reservoir" (V. M. Dmitriyev, V. P. Mitrofanov), "Validation of Optimum Catch and Rational Exploitation of Fish Stock in the Tsimlyansk Reservoir" (I. I. Lapitskiy), "Fish Resources of Veselovskiy and Proletarskiy Reservoirs, Means of Augmenting and Making Wise Use of Them" (V. M. Tyunyakov) and others.

Several of the poster reports touched upon general aspects of theory of dynamics of fish population (Yu. S. Reshetnikov), forecasting fish stock (V. A. Kuznetsov, V. Ya. Pervozvanskiy), investigation of fish migrations as related to dynamics of their population size (D. S. Pavlov), distinctions of formation of population size in early ontogenesis (Ye. M. Karaseva), evaluation of reproductive capacity of fish populations (V. V. Kontorin), formation of acclimated fish populations (A. F. Karpevich) and others.

Publication of a collection of summaries of papers, amounting to 21.3 publisher's record sheets, before the conference started was helpful in its active work.

The decision adopted by the conference evaluated the status of scientific research on the problem of dynamics of population size and rational use of commercial fish stock, and defined the future tasks in this area. The conference noted that the ecosystem approach is being used more and more extensively in fishery research, which makes it possible to take into consideration the distinctions of interspecific relations and impact of fishing based on several fish species simultaneously. Analysis of changes in communities of aquatic ecosystems that occur under the influence of anthropogenic factors (intensification of fishing, its selectivity, eutrophication of reservoirs, etc.) are acquiring increasing significance in studies of fish population dynamics.

The conference deems it necessary for sectorial, academic and VUZ scientific teams to concentrate on development of the following key problems: refinement and broad introduction of objective methods of assessing stock--biostatistical, direct counts by means of instrumentation, trawler, nonaqueous and other photos, tagging, etc.; intensification of research and practical introduction of criteria and methods of regulating fishing in order to find the optimum conditions for exploiting the different objects of fishing; providing for systematic and competent gathering of diverse and reliable information about caught fish in order to establish a unified All-Union bank of statistical data about fishing; in-depth integrated studies of development and survival of fish in embryogenesis and competitive relations of larval forms against the background of changes in biological productivity of bodies of water; refinement of methods of determining the age of fish, since calculation of population size of generations cannot be made without assessment of dynamics of age composition in accordance with accurate statistics about catches; expansion of research in the area of population physiology of fish, investigation of fish nutrition and food relations, conditions of availability of food to fish larvae as related to the "spottiness" factor in distribution of larvae and their food; investigation of the impact of hydraulic engineering projects and irrigation on the catch and selectivity of fishing; finally, assurance of

economic validation of all recommendations for improving the raw materials base and increasing fish catches in fresh-water basins.

The conference offered several recommendations on questions of improved training of ichthyologists, holding methodological and scientific conferences on the problem of fish population dynamics. It was deemed necessary to convoke an All-Union congress of ichthyologists, at which one should examine questions of further development of investigative methods for different areas of ichthyology, refine methods of evaluating fish stock and predicting it, means of increasing fish productivity of reservoirs and rational construction of fisheries in different types of bodies of water, refinement of integrated targets of programs of fishery research.

In conclusion, the All-Union conference called upon all workers involved in fishery science and practice to solve the most important problems of rational management of the fish industry in seas and inland waters in close collaboration, under present conditions and thereby to participate in effective implementation of the decisions of the 26th CPSU Congress and May (1982) Plenum of the CPSU Central Committee.

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SYMPOSIUM "BIOCHEMISTRY, PHARMACOLOGY AND MEDICAL APPLICATION OF VITAMIN DERIVATIVES AND OTHER COENZYME PRECURSORS" (IRKUTSK, 8-10 SEP 83)

Moscow VOPROSY PITANIYA in Russian No 3, May-Jun 84 pp 76-77

MOYSEYENOK, A.G., Grodno

[Abstract] The title symposium was held as a part of the plenary session of a special commission on "Medical Nutritional Problems" of the USSR Academy of Medical Sciences. The following topics were addressed: biochemistry and biotechnology of coenzymes Acyl-CoA, coenzyme A and its precursors in regulating metabolism; synthesis and analytical methods for vitamins and coenzymes; pharmacological properties and pharmacokinetics; use of vitamins and their derivatives in experimental pathology; comparative clinical-experimental analysis of pantothenic acid derivatives and the use of vitamins in therapeutic and prophylactic approaches. A seven-point resolution was accepted stressing the priority of work in water-soluble vitamins, use of these agents in treating alcoholics, evaluation of the adequacy of vitamin intake of the eastern Siberia population, wider use of potassium pantothenate and related derivatives and further development of new biotechnology in production of vitamins and especially coenzymes.

[694-7813]

UDC 581.12/13:639.64(047)

SECOND ALL-UNION CONFERENCE ON MARINE BIOLOGY (VLADIVOSTOK 17-20 SEP 82)

Moscow FIZIOLOGIYA RASTENIY in Russian Vol 31, No 3 May-Jun 84 pp 606-607

STROGONOV, B.P., SPEKTOROV, K.S. and BALNOKIN, Yu.V.

[Abstract] Most of the conference papers dealing with the physiology of algae reported studies of the photosynthesis and light adaptation of algae. The majority of these studies were done in the Photosynthesis Laboratory at the Institute of Marine Biology. A number of papers covered photosynthetic productivity of algae in relationship to geographic zones, depth of their habitation and seasonal changes. Work was reported on the pollution of the sea with industrial wastes in the zone close to the seashore: effects of heavy metals on the species composition of algaflora, their productivity and

biochemical composition and mechanisms of action. Some positive effects of industrial wastes were noted. Only five papers were devoted to the biochemistry of plants. It was concluded that the work on sea plant physiology in the USSR need further expansion.

[683-7813]

UDC 577.1+57:61]:061.24.053"1983"

6TH PLENUM OF SCIENTIFIC COUNCIL ON BIOLOGICAL AND MEDICAL CHEMISTRY

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 30, No 1, Jan-Feb 84
pp 136-140

INSHAKOVA, V.M. and AGABABOVA, I.S.

[Abstract] The 6th Annual Plenum of the Scientific Council on Biological and Medical Chemistry was held on April 7-8, 1983 at the Institute of Biological and Medical Chemistry of the USSR Academy of Medical Sciences. The Plenum was attended by representative of 32 establishments from 18 cities. An overview of the various research papers and summaries of research projects shows that in 1982 emphasis was placed on the synthesis, structure, function and metabolism of various proteins and enzymes, biogenic amines, lipid metabolism, and structure-function characteristics of biological membranes. Studies on carbohydrate metabolism dealt primarily with the clinical enzymology and enzyme therapy of inborn errors of metabolism. Other research efforts concentrated on clinical chemistry, endogenous opiates, and structure-activity factors in drug design. Some of the more important resolutions of the meeting dealt with the need to place greater emphasis on biochemical pharmacology, improve the qualifications of research personnel, and promote practical implementation of research results.

[1513-12172]

PARASITOGENOLOGISTS' FORUM

Omsk ZEMLYA SIBIRSKAYA DAL'NEVOSTOCHNAYA in Russian No 3, Mar 84 pp 55-56

IOGANZEN, B.G., professor, Tomsk University, and LOGACHEV, Ye.D., professor, Kemerovo Medical Institute

[Abstract] The Second All-Union Conference of Parasitocenologists was held in Kiev in October 1983. The participants included more than 400 scientists and other interested personnel from every republic of the Soviet Union. The meeting was opened by the President of the Ukrainian SSR and twice Hero of the Socialist Labor, Academician B.Ye. Paton. In addition to three plenary sessions, the conference was also organized into sections on general parasitocenology, medical and veterinary parasitocenology, acaro-, entomo- and

phytoparasitocenology, nest and burrow microbiocenoses, mathematical models for exoparasitic systems, and host-parasite relationships. The meeting helped to summarize the research results secured by Soviet specialists, and emphasized the considerable success that has been achieved in the control of human and animal parasitic diseases.

[60'-12172]

DECLARATION OF PARTICIPANTS OF 7TH CONFERENCE OF NATIONAL COMMITTEES OF BIOLOGISTS OF SOCIALIST COUNTRIES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 84 p 96

[Abstract] Participants of the 7th Conference of the National Committees of Biologists of the Socialist Countries, held in Sofia in December 1983, issued a joint declaration condemning the recent acceleration of nuclear rearmament in Europe. The introduction of rockets with nuclear warheads threatens not only Europe, but the entire world and increases the chances of a world-wide nuclear conflict. The participants, therefore, felt it incumbent upon them to issue a warning against such policies and to alert all biologists to the dire consequences to which such policies may lead.

[725-12172]

BRIEFS

BIOORGANIC CHEMISTRY AND MOLECULAR BIOLOGY CONFERENCE--Leading centers of world chemical and biological science were represented at the international symposium "Perspectives of Bioorganic Chemistry and Molecular Biology" which opened in Moscow on July 19. This meeting of scientists took place under the auspices of the International Council of Scientific Societies, the International Society for Biochemistry and the Federation of European Biochemical Societies. The program of this scientific forum reflected the most important tendencies in biological science and most recent methods of studying living matter and its components at various levels of structural organization, as was stated by Academician Yu.A. Ovchinnikov, vice-president of the USSR Academy of Sciences. Academician A.P. Aleksandrov, president of the USSR Academy of Sciences, emphasized that today, in a time when the international situation is rapidly becoming more tense, meetings of scientists from different countries acquire special significance. On June 20 the participants in the international scientific meeting will fly to Alma-Ata where the symposium will continue. [Text] [Moscow PRAVDA in Russian 20 Jun 84 p 2] 9582

CONFERENCE ON PLANT RESOURCES--The outlook for development of mutual contacts in the investigation, conservation, and utilization of plant resources is being reviewed by a scientific coordination conference of biologists from nations belonging to the Council for Mutual Economic Assistance. The meeting began in Tashkent on June 7. Representatives of Bulgaria, Hungary, the GDR, Poland, Rumania, the USSR and Czechoslovakia are exchanging information on compiling in national collections new forms of cultivated plants and their wild relatives, as well as discussing problems of future cooperation in this field. [Text] [Tashkent PRAVDA VOSTOKA in Russian 8 Jun 84 p 1] 9582

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FORTIETH ANNIVERSARY OF USSR ACADEMY OF MEDICAL SCIENCES

Moscow MEDITSINSKAYA RADILOGIYA in Russian No 6, Jun 84 pp 3-6

[Lead Article by G.A. Zedgenidze]

[Text] Forty years ago, in June 1944, a decree of the CPSU Central Committee and the Soviet government was issued concerning the organization of the USSR Academy of Medical Sciences. It was at this time that the Soviet nation and its armed forces under the leadership of the communist party gained a number of major victories at the front, indicating the approach of a fundamental turning point in the Great Patriotic War.

In January 1944, Leningrad was completely liberated from the blockade that had lasted for 900 days and nights. During this difficult time for the country and its economy, when it was practically necessary to start cities and villages anew, industry and agriculture, party and government, taking into consideration the interests of workers and Soviet public health tasks dealing with elimination of the consequences of war and restoration of health to wounded and sick troops of the armed forces, as well as the need to further develop medical science and its scientific-technical progress, felt that it was possible to organize the Academy of Medical Sciences.

The first prototype of the USSR Academy of Medical Sciences was the State Institute of People's Health (GINZ), organized in 1920 and comprised of several institutes. The structure of these institutes reflected the tasks of Soviet medicine of that time, particularly control of acute infections, tuberculosis and certain tropical diseases. Of course, work was also being done on problems of experimental biology.

The USSR Academy of Medical Sciences has become the highest scientific organ in the field of medicine, a kind of general headquarters for the planning and coordination of medical science in the country and for the administration of its development. These problems, particularly planning and coordination, acquire exceptionally great significance under our conditions, due to the fact that many institutions of the USSR Ministry of Health and union republics in various cities, krays and oblasts of the country are engaged in scientific work. Coordination of scientific work on the USSR scale makes it possible to avoid repetitions or unnecessary parallelism in research, and to attain a high

degree of effectiveness and prompt implementation of the results of scientific research in clinical practice. Throughout the entire 40-year activity of the Academy of Medical Sciences, particular attention has been given to choice of the most promising directions in scientific research and the focusing of scientific efforts and material resources on the most important problems of medical science and technical progress. The CPSU, as always, has been this powerful mobilizing and organizing force, guaranteeing continual progress and forward movement in the activity of the USSR Academy of Medical Sciences. Scientists and medical men of world renown N.N. Burdenko, N.N. Anichkov, A.N. Bakulev, V.D. Timakov and N.N. Blokhin, etc., have made a worthy contribution to the organization of the USSR Academy of Medical Sciences and to the development of Soviet medical science.

At the present time, when science is becoming even more of a production force, the role and practical significance of the USSR Academy of Medical Sciences in the development of medical science and the Soviet health system is growing significantly. The successes that have been attained are a strong basis for the solution to new, more complex and demanding problems presented by the 26th Part, Congress and subsequent CPSU Central Committee plenums.

The USSR Academy of Medical Sciences is made up of approximately 100 academicians and 150 corresponding members. Tasks of the USSR Academy of Medical Sciences are the planning of scientific research work in the country, working out the most urgent problems in the theory and practice of medicine and coordinating scientific research together with the Medical Scientific Council of the USSR Ministry of Health, as well as training highly skilled scientific personnel in the area of medicine and biological science. More than 50 scientific research institutes in various republics of the country are within its system and under its direct jurisdiction. A Siberian Department of the USSR Academy of Medical Sciences was recently organized; it is comprised of institutes of this department and branches of Moscow medical centers in Novosibirsk, Tomsk, Blagoveshchensk, Krasnoyarsk and Novokuznetsk.

The research institutes are united organizationally in three departments of the Academy--medical-biological Sciences, clinical medicine and hygiene-microbiology-and-epidemiology.

Scientific councils dealing with various medical specialists and medical-biological problems are operating under the auspices of the USSR Academy of Medical Sciences Presidium; their basic task is coordination of scientific studies conducted at various institutions of the country, including Academy institutes. Members of the USSR Academy of Medical Sciences, as are the scientific associates of its institutes, are extensively involved as active participants in organizational-scientific activity on permanent commissions, councils, committees and bureos existing under the auspices of the Presidium. The Scientific Publishers' Council (NISO), which treats questions of the publication of monographs and books and also 11 periodical printed publications (journals, bulletins, etc.) belong to them, together with all-union scientific societies. The Interacademy Scientific Council on Fundamental Problems of Medicine, created in accordance with a resolution of a joint USSR Academy of Sciences and Academy of Medical Sciences Commission in 1980 has a special role. The work of this council must further and promote the

development of joint research on the most important problems of medicine and biology, medicine and physics, chemistry, cybernetics, etc.

As reported, at the 50th session of the USSR Academy of Medical Sciences General Meeting, by N.N. Blokhin, academician and president of the USSR Academy of Medical Sciences, a Soviet committee "Physicians for the Prevention of Nuclear War", whose work has found broad support among Soviet medical personnel, and an all-union commission for furthering the collection of signatures calling upon physicians of the world to curtail the nuclear arms race have been created and are actively working under the auspices of the USSR Academy of Medical Sciences. Not just physicians, but also mid-level medical personnel and medical students are extensively participating in the programs of these organizations.

The USSR Academy of Medical Sciences, institutes with'n its jurisdiction, and scientific councils and commissions devote substantial attention to the study of advanced achievements and experience of foreign scientists, the establishment of scientific communications, and the popularization of the successes of domestic science abroad, particularly in socialist countries.

Over the last four decades, many important problems and urgent questions have been worked out at the scientific research institutions of the USSR Academy of Medical Sciences, enriching medical theory and practice and providing more than appreciable success in such areas as surgery, oncology, medical radiology and biology, cardiovascular surgery, neurology and neurosurgery, poliomyelitis research, the prevention and treatment of cardiovascular disease, including hypertension, infarction, cardiovascular insufficiency, etc. Moreover, Soviet medicine opened up new directions, in certain cases earlier than this was done in the West, and is now successfully forging ahead. In this regard, problems of helping public health organs and assimilating the results of scientific research into the daily practice of therapeutic-prophylactic and sanitary-epidemiological institutions of the country are among the central and most important issues in the work of the Academy itself and the institutes subordinate to it. In this aspect, out-of-town sessions and expanded meetings of the Presidium and department buros are a great help.

It should be emphasized that the USSR Academy of Medical Sciences has played a special role in the development and academic formulation of a number of disciplines, including roentgenology and medical radiology, i.e., nuclear medicine and nuclear biology. By the beginning of the 50's, all progressive humanity was engaged in a struggle with all available forces and means against the cold war and its initiators--government leaders of the United States and Great Britain. The institution of the International Atomic Energy Agency (IAEA) was one of the measures intended to establish a "new road to peace". The Soviet Union promoted the organization of this agency, and was among the first to become an active member of it. A broad path was opened for the use of atomic energy for peaceful purposes in the USSR, the first atomic power plant in the world was built, and the monthly scientific journal MEDITSINSKAYA RADIOLOGIYA was founded (1956). It was supposed to promote extensive exchange of experience and results of scientific research on the peaceful use of atomic energy in medicine and biology, particularly in the prevention, diagnosis and treatment of various diseases.

In accordance with confirmation of the IAEA Code (1957), the agency was entrusted with "striving to attain the quickest and broadest use of atomic energy to maintain peace, health and prosperity throughout the world." The agency was thereby charged with adopting all measures so that the help given by it to institutions or countries would not be used for military purposes. The First and Second Geneva Conferences on the peaceful use of atomic energy (1955, 1957) dealt with this same appeal to all countries of the world--to promote the peaceful use of atomic energy. The USSR was the first of all states and countries of the world to respond to this appeal. Decisively and firmly approving the initiative of the peaceful use of atomic energy, in August, 1957, the CPSU Central Committee and the Soviet state adopted a resolution on the construction of a major scientific center for the application of atomic energy in medicine. As a result of this, the USSR Academy of Medical Sciences was commissioned to construct and organize a Scientific Research Institute for Medical Radiology at Obninsk. In addition to the construction of a new scientific research institute that was powerful in terms of size, technical equipment and qualified personnel, the USSR Academy of Medical Sciences significantly expanded the X-ray departments of institutions within its jurisdiction and equipped them with modern equipment and apparatus, which served as the basis for the further development of roentgenology and radiology in the USSR and the fulfillment of a number of research studies in the area of cardiovascular surgery, neurosurgery, cardiology, etc.

Managed by the USSR Academy of Medical Sciences, the Scientific Research Institute for Medical Radiology has been conducting fruitful study for more than 20 years in various areas of X-ray diagnosis and radionuclide diagnosis, radiobiology and radiation therapy, as well as the technology and physics of ionizing radiation. It is specifically this institute that has established a new scientific direction in medical radiology in our country, radionuclide diagnosis, which has found broad application in public health practice. Lymphology and clinical lymphography were regenerated and further developed here. The only specialized department in our country dealing with the treatment of patients with local radiation injuries to various organs and tissues is successfully functioning at the institute, as is the All-Union Procedural Center for the Diagnosis and Treatment of Lymphogranulomatosis. The institute is the chief institution in the country dealing with the problem of roentgenology and radiology and coordinates scientific activity of more than 100 specialized scientific research institutes and faculties of medical institutes and institutes for the advanced training of physicians.

The Scientific Council on the Combined Problem of Roentgenology and Radiology under the auspices of the USSR Academy of Medical Sciences Presidium is becoming increasingly important in guidance of X-ray scientists and radiologists. The creation of a number of problem commissions and out-of town sessions in various republics and cities to acquaint them with research being carried out here and to give appropriate help when needed are contributing to this. At the present time an all-union program dealing with promising scientific research in the area of roentgenology and radiology has been formulated by the scientific council.

Special mention should be made of the effective work of the USSR Academy of Medical Sciences Scientific Research Institute for Medical Radiology in organizing and conducting a number of all-union scientific conferences, including some with foreign participation, as well as symposia, working conferences, etc. The institute's work dealing with scientific information on inventions, dissertations, etc., is also important; the appropriate materials are systematically published in the journal MEDITINSKAYA RADIOLOGIYA.

It is appropriate to emphasize that in recent years, the basic output of printed matter in the form of journal articles has been emanating from the scientific research institute system of the USSR Academy of Medical Sciences: the Medical Radiology Scientific Research Institute, the All-Union Oncology Scientific Center, the All-Union Cardiology Scientific Center, the Neurosurgery Institute imeni N.N. Burdenko, etc.

Scientific personnel and production workers at institutions in the USSR Academy of Medical Sciences system and the USSR Ministry of Health accepted with enthusiasm the innovative scale tasks presented to them in a decree of the CPSU Central Committee and the USSR Council of Ministers "Measures for the Acceleration of Scientific-Technical Progress in the National Economy", in accordance with a course worked out at the 25th and 26th CPSU Congresses dealing with the intensification of public production and the extensive use of the achievements of science and technology. This requires mobilization of all creative efforts for further rapid progress of the entire national economy, including public health, toward new limits of scientific-technical progress. Scientific research institutions of the USSR Academy of Medical Sciences and the USSR Ministry of Health, as well as individual scientists working in the area of medical science must achieve an increase in the effectiveness of their research studies and must actively promote the broad implementation of the achievements of science in clinical practice, and increase the level and quality of service to the population.

In our opinion, the following should be considered the most important among the main directions for accelerating scientific-technical progress in roentgenology and radiology: 1) Standardization of investigative procedures for the more frequent and important diseases of certain organs. For example, more than 20 radionuclide examination procedures exist for examination of the functional state of the liver, and a broad group of physicians need recommendations as to choice of the best and most accessible one. The same situation exists in X-ray diagnosis; 2) Development of a scientifically based sequence for the execution of various procedures for radiation diagnosis of a specific disease for each organ or organ system, in order to recommend it for clinical practice. Recommendations such as this are necessary so that the greatest amount of diagnostically-effective information might be attained in actual practice, with a minimum expenditure of time and labor; 3) Broad application of computer technology, in diagnostic procedures as well as in radiation therapy. Such diagnostic investigative procedures as computer tomography in X-ray, radionuclide or ultrasound diagnosis as well as nuclear magnetic resonance are increasingly becoming an integral part of clinical diagnosis; 4) Further development and improvement in the creative clinical thought of the physician, so that results of the application of technological

investigative methods, however tempting, high and precise they may be, might not supplant a live human being. Scientific-technological progress in prophylaxis and in therapeutic-diagnostic practice is unthinkable without the creative, exemplary organization of matters in a therapeutic institution and without clinical thought on the part of the physician and an individual approach to each patient. This is what in the past the classics of Russian medicine called clinical intuition.

The tasks dealing with further improvement in the planning of medical science and its administration presented to the USSR Academy of Medical Sciences by our party and the state are lofty and honorable. Particular attention, in our opinion, must be focused on the main directions of scientific-technical progress and on the most rapid implementation and full use of its achievements in medical science and practical health care.

In materials of the December (1983) as well as the February and April (1984) CPSU Central Committee Plenums, it is emphasized that it is "important to maintain the chosen tempo, the general inclination toward practical solution to problems, and to steadily raise the level of supervision and actively develop the tendency toward growth in effectiveness of scientific investigations, to place the main emphasis on increasing the level and accelerating scientific-technical progress, and to guarantee fulfillment of quotas established for the development of health care and medical science."

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ROLE OF MIGRATION IN FORMING MARRIAGE STRUCTURE OF MOSCOW POPULATION.
REPORT 1. AGE, BIRTHPLACE AND NATIONALITY OF COUPLES MARRYING

Moscow GENETIKA in Russian Vol 20, No 3, Mar 84
(manuscript received 7 Jun 83) pp 501-511

KURBATOVA, O.L., POBEDONOSTSEVA, Ye.Yu. and IMASHEVA, A.G., Institute of General Genetics, USSR Academy of Sciences, Moscow

[Abstract] Marriage records for 1955 (3485 marriages) and 1980 (2676 marriages), demographic statistics for the turn of the 19th Century and current statistics were used in a genetic-demographic study of dynamics of the marriage structure of the Moscow population with regard to age, birthplace and nationality of couples. The mean age at marriage of Moscow residents of reproductive age has remained virtually unchanged but the number of persons under 20 years of age was much higher in 1900 than at present. The number of marriages involving persons of post-reproductive age was higher in 1980 than in 1955. Migration factors affecting the structure of future Moscow generations are described and discussed. High values of ($0.57 < m < 0.86$) the coefficient of migration into Moscow correspond to the period of unrestricted growth of the city population. The coefficient of migration into Moscow decreased by 1980 but still remained high. The average distance of migration into Moscow increased; from an average of 230 km in 1900 to an average of 560 km in 1955 and an average of 1100 km in 1980. There was a considerable increase in the number of immigrants from southern and eastern parts of the country. These changes in migration will increase reproduction of the entire country gene pool in Moscow and may produce genetic uniqueness of the Moscow population. Figures 2; references 23: 20 Russian; 3 Western.

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